EXTENDING MODELS OF SELF-REGULATED LEARNING TO WORKING ADULTS: IMPLICATIONS FOR ONLINE ADVANCED SKILL TRAINING

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SUMMARY

Despite an increase in the prevalence of online skill training programs for working adults, little is known about the self-regulated learning (SRL) strategies by which adults manage their learning in such programs. The objective of the current project was to investigate the nature of self-regulated learning strategy use among working adults engaged in an online skill training program. 75 in-depth interviews were conducted with adults enrolled in an online Master's of Computer Science program, and these data were subjected to a qualitative thematic analysis as well as exploratory analyses concerning gender and age differences. Findings support the extension of extant SRL models to emphasize a novel set of strategies employed by online adult learners, including 1) a greater emphasis on 'macro' strategy use, 2) a priori time management tactics, and 3) reliance on a functionally diverse social network for help with management of both learning and non-learning demands. Implications are discussed regarding future directions for measurement of SRL in working adults and the development of interventions for working adults' learning management.

CHAPTER 1. INTRODUCTION

As people experience longer working lives (OECD, 2006) and the job skills valued by the marketplace change (Cappelli, 2015), more adults will be expected to develop new job skills during their working life. Historically, most new job skill learning has occurred informally in the form of on-the-job training (Altonji & Spletzer, 1991). Increasingly, however, working adults have sought formal, degree-based educational programs that offer opportunities for career advancement or occupational change. To accommodate working adults, many of these programs are offered online. This trend is reflected in nationwide graduate enrollment patterns, where from 2004 to 2016, the rate of graduate students over the age of 30 enrolled in a fully online program has increased from 9.0% to 41.6% (National Center for Education Statistics, 2017, Table 311.32).

In on-the job training, success has historically been predicted primarily by various individual differences (in both ability and non-ability traits) as well as job/work characteristics (e.g., task difficulty, manager support) (Altonji & Spletzer, 1991; Tannenbaum & Yukl, 1992). In contrast, successful degree completion and achievement of other learning outcomes (e.g., skill acquisition and transfer) in online degree programs is posited to also rely heavily on the adult learner's ability to effectively manage his/her time and monitor his/her learning activities; in other words, on the learner's self-regulatory/self-management competencies. Although there currently exists a voluminous literature on self-management and self-regulation in the context of K-12 and collegiate education (for a recent review, see Panadero, 2017), there has been far less research on the nature of self-regulatory strategy use among adult learners engaged in work-related, formal

education. Traditional studies of self-regulated learning in the K-12 and collegiate populations may not generalize well to working adults for several reasons, including differences in age and age-related individual differences, non-learning demands (e.g., childcare or other caregiving, employment), and reasons for learning (e.g., transferring skills to work, pursuing a career change).

One particularly promising opportunity to close this gap in the literature comes in the form of online graduate programs in STEM fields like computer science (CS). These programs provide advanced skill training that is highly relevant to skills valued by the marketplace. For example, over 500,000 new CS and information technology jobs are projected to be created between 2018 and 2028 (Bureau of Labor Statistics, 2019). For working adults who need to reskill or upskill in order to improve employability for technical roles, online graduate programs are typically more accessible than traditional forms of education (e.g., residential degrees) (Goodman, Melkers, & Pallais, 2019). Online programs are also shorter in length than undergraduate degrees and offer more credibility and structure than non-degree certificates or stand-alone courses (e.g., Massive Open Online Courses, MOOCs).

The objective of the current project was to investigate the nature of self-regulated learning strategy use among working adults engaged in an online skill training program. In the following sections, I first provide a brief review of the self-regulated learning literature in order to provide a conceptual foundation for the present study. Next, I describe the online context in which I studied adult learners' self-regulated learning strategies, as well as key research findings and associated issues related to measurement of those learning strategies in the online context. Importantly, I address critical differences between adult online

learners and other populations (e.g., high school and traditional college students) that are more highly represented in the current literature. I argue that these differences have meaningful implications for how I conceptualize self-regulated learning for working adults. In the third and final section, I review and summarize the goals of the current study, provide an overview of the study design, and present research questions.

1.1 Self-Regulation Theory

Consistent with the social cognitive approach developed by Bandura (1986), self-regulation can be defined as the purposive, self-driven processes by which individuals seek to accomplish some goal, where a goal refers to the mental representation of a desired outcome that guides action (R. Kanfer & F. Kanfer, 1991). Self-regulation has been studied as both a trait and a set of processes (see R. Kanfer, 2012), although the majority of studies investigating self-regulation in the context of learning have adopted a state-oriented, process approach. In the process framework, self-regulation consists of several connected but conceptually distinct activities (Zimmerman, 2000). Self-regulation theorists (e.g., Bandura, 1991, F.H Kanfer, 1970; Mischel, Cantor, & Feldman, 1996) have delineated three key components involved in self-regulation: self-monitoring, self-evaluation of behavior or performance compared to the goal, and affective self-reactions. As summarized by R. Kanfer (2012), effective self-regulation requires that individuals 1) monitor goal-relevant behaviors and their outcomes, 2) evaluate the impact of current resource allocation on goal progress, and 3) make accurate judgments that influence both confidence in goal achievement as well as subsequent adjustment of strategies for goal accomplishment. Accordingly, self-regulatory processes include monitoring and altering cognitive or affective states (e.g., attention or self-efficacy), monitoring and adjusting behavior during

a task, and attempting to influence one's environment to be more suitable for goal attainment (Zimmerman, 2000).

Self-regulation theorists see goal setting as an integral part of the self-regulation process (Bandura, 1986; 1991; Locke, Shaw, Saari, & Latham, 1981; Mischel et al., 1996). Goal selection is critical for accomplishing difficult acts because it helps to focus and sustain attention and to delineate a pathway for goal accomplishment. Self-regulation consists of a self-perpetuating cycle of goal setting and goal pursuit processes, each of which interacts with the other (Bandura, 1986; F.H. Kanfer, 1979; Zimmerman, 2000). Researchers interested in self-regulation have emphasized the importance of goal selection by explicitly framing it in the context of inherently limited resources (e.g., Freund & Baltes, 2000; Schmidt & Dolis, 2009).

During goal pursuit, for example, individuals direct attentional resources to goal-relevant tasks. Performance can be hindered if the cognitive resources required by the task plus ancillary self-regulatory processes exceed the individuals' available resources (R. Kanfer & Ackerman, 1989). Individuals can use self-regulatory strategies to achieve difficult tasks by effectively acquiring and allocating resources and means that will help them attain their goals. For example, behavioral regulation (Zimmerman, 2000) may occur through strategies such as allocating persistent effort to a task or switching to a secondary approach if the first approach is not successful. Environmental regulation (Zimmerman, 2000) may occur through strategies such as setting aside specific time for a goal-relevant task ahead of time or enlisting the use of external aids for a task.

1.1.1 Self-Regulated Learning

Students' use of self-regulatory strategies to achieve academic or educational goals has been referred to as self-regulated learning (SRL) (e.g., Zimmerman & Schunk, 1989). Like broader process models of self-regulation, models of SRL are cyclical in nature and have significant motivational components (Boekaerts, 1999; Pintrich, 1999; Zimmerman, 2000). Success or failure in past learning experiences provide information for effective regulation of future goal-striving, and variables such as goals or self-efficacy beliefs are important for understanding the choice to engage in future self-regulation (Pajares, 2011; Schunk & Usher, 2011).

Zimmerman's (2000) Cyclical Phases model (for the most recent version, see Zimmerman & Moylan, 2009) is the most popular model of SRL in the educational literature (Panadero, 2017). In this model, SRL occurs in 'phases' of forethought, performance, and self-reflection, which correspond respectively to behaviors and cognitions engaged in by the learner before, during, and after task completion. In each phase, a range of potential strategies for self-regulation exist (a summary of these strategies can be found in **Table 1**). The social cognitive perspective on self-regulation suggests that the most effective goal pursuit strategies may vary based on attributes of the person, the goal and/or task, and the external environment (Bandura, 1986; Zimmerman, 2000), and this is also posited to be the case for SRL (Zimmerman, 1998; Zimmerman 2000). Zimmerman (1998) argues that self-regulating learners can be distinguished from non-self-regulating learners not by the presence or absence of any particular behavior or strategy, but rather by the extent to which they self-initiate a behavior or strategy for the intentional purpose of reducing the difference between their current state and a given goal (for additional discussion of self-regulation as a means of performance-goal discrepancy

reduction, see Carver & Scheier, 1981). Therefore, individual differences in goals, ability, resources, and so on may lead to different combinations of behaviors that could all be considered to be examples of effective SRL strategy use.

Table 1. SRL Strategies in the Cyclical Phase Model (Zimmerman & Moylan, 2009)

Phase	Strategies
Forethought	
Task Analysis	Goal setting, Strategic planning
Self-Motivation Beliefs	Self-efficacy, Outcome expectations, Task interest/value, Goal orientation
Performance	
Self-Control	Task strategies. Self-instruction, Imagery, Time management, Environmental structuring, Help-seeking, Interest incentives, self-consequences
Self-Observation	Metacognitive monitoring, Self-recording
Self-Reflection	
Self-Judgment	Self-evaluation, Causal attribution
Self-Reaction	Self-satisfaction/affect, Adaptive/defensive

In early reviews on the topic, SRL strategies were broadly categorized into three levels, ranging from 'micro' information processing strategies to more 'macro' management of resources: 1) regulation of cognitive processing strategies, 2) metacognitive strategies, and 3) resource management strategies (Boekaerts, 1999; Pintrich, 1999).

The first "micro" level primarily involves selecting and coordinating appropriate cognitive strategies for attending to and processing task-relevant information, such as lectures or course readings (Boekaerts, 1999). Depending on the intensity of the student's engagement with course material, these strategies may range in depth, from 'shallow' strategies such as rehearsal (e.g., memorizing vocabulary), to 'deeper' strategies focused

on conceptual understanding (e.g., making connections from main ideas to other course concepts) (Boekaerts, 1999; Pintrich, 1999; Weinstein & Mayer, 1986).

The second "metacognitive" level involves intentional management or regulation of the cognitive strategies described above. Given that a range of potential cognitive learning strategies exists, metacognitive self-regulation requires that the student is knowledgeable about and aware of 1) his or her choice to engage in certain cognitive learning strategies while avoiding others, 2) the effectiveness of those strategies for improving learning outcomes, and 3) methods for altering cognitive learning strategies in the case that they are not producing optimal results (Boekaerts, 1999; Pintrich, Wolters, & Baxter, 1999). However, this awareness alone is not sufficient to qualify as metacognitive self-regulation. This level of self-regulation only occurs when the student actively monitors and reflects on his or her cognitive strategy use, and maintains or changes relevant behaviors according to these evaluations (Pintrich, 1999).

The third resource management level involves managing both internal (e.g., sustained effort) and external (e.g., help from a peer) resources in order to engineer an environment that is suitable for achievement of academic goals (Pintrich, 1999). Some researchers have focused on studying these strategies in the context of students' ability and willingness to allocate attentional resources (e.g., sustained effort over time) to improving learning management (e.g., Rheinberg, Vollmeyer, & Rollett, 2000). Others have extended this research stream to include environmental structuring (e.g., seeking out non-disruptive environments for studying) and management of social resources (e.g., help-seeking from peers) as critical SRL strategies (Zimmerman, 1998).

1.2 Adult Online Skill Learning

Distance education enrollments in the US have increased fourteen years in a row (Seaman, Allen, & Seaman 2018), suggesting an increasing legitimacy of and reliance on asynchronous, online learning settings. Such learning settings are particularly well-suited for working adults, whose jobs typically require their attention during standard working hours and who therefore experience conflict with synchronous class schedules (Bourdeaux & Schoenack, 2016). In the most general terms, asynchronous online courses typically consist of some form of instructional material (e.g. recorded or video lectures, web-based interactive modules, assigned reading), some form of assessment (e.g. practice assignments, quizzes/tests, projects), and frequently, a means by which students can communicate with peers and/or instructors (e.g., email, discussion forums) (Caplan & Graham, 2008; Koszalka & Ganesan, 2004). It is important to note that there is no universal method of designing an online course, and that different disciplines or even courses within disciplines may have wide variation in course design (Caplan & Graham, 2008).

As the nature of work changes, adults will be tasked with acquiring or updating the necessary skills to meet market demands (Brown, Bimrose, Barnes, & Hughes, 2012; Bughin et al., 2018; Manyika et al., 2017), but may be limited to building those skillsets (e.g., advanced technical skills) in ways that do not interfere with their current employment. One means of acquiring these skills is through online graduate education versus in-person education. In the 2015-2016 school year, for example, approximately 23 million students were enrolled in post-secondary programs, nearly half of whom were adults age 24 or older (National Center for Education Statistics, 2017, Table 311.22-311.32). These adult learners show enrollment patterns distinctly different from their younger peers. For students

enrolled in a graduate degree, 41.6% of students age 30 or older were in an entirely online program compared to 16.8% of students ages 24 to 29 and 8.0% of students ages 15-23 (National Center for Education Statistics, 2017, Table 311.32). Taken together, these statistics suggest that working-age adults seeking to upskill, or build upon their skillset through further education, are more likely to enroll in an online program than traditional college-age students (e.g., ages 18-23).

Accordingly, online education represents a fruitful context in which to study adaptive learning strategies among working adults. Knowing why adults choose to pursue further education or skills, understanding how they manage their resources to pursue learning goals, and how strategies relate to learning outcomes will allow researchers and educators to advocate for programs that encourage skill acquisition in more vulnerable populations (i.e., in mid-career workers or workers at risk of losing their job to automation). For example, high-quality, asynchronous online graduate programs in computer science are expanding access to and increasing enrollment of adult learners who otherwise likely would not have pursued further education (Goodman et al., 2019).

One such program is the focus of the current study. Georgia Tech's Online Masters of Science in Computer Science (OMSCS) was founded in 2014 as a lower cost alternative to the on campus offering of the same degree, in order to address demand for lifelong learning by increasing the scale of degree-based programs (Joyner, Isbell, Starner, & Goel, 2019). Where access to the on-campus program has been limited by physical seat capacity, the online program has thus far been able to increase enrollment at a rate matching the growth of applications from qualified students (Joyner & Isbell, 2019). Comparison of application and enrollment data from the on-campus and online programs suggests that the

online program is drawing a mostly unique student pool; that is, OMSCS is expanding the reach of graduate-level CS training rather than drawing students away from the on-campus option (Goodman et al., 2019; Joyner & Isbell, 2019).

1.2.1 Characteristics of Adult Learners in the Online Context

Before I can begin to understand adult learners' behaviors and experiences in online courses, it is critical to understand more about the characteristics and backgrounds of individuals who enroll. For the purpose of the current study, online learners are defined as post-baccalaureate adults enrolled in an online-only graduate Masters of Computer Science degree program. Whereas applicants to the traditional (residential) Masters of Science in Computer Science (MSCS) degree are typically in their early to mid-twenties (M = 23.9), applicants to the Online (only) Masters of Science in Computer Science (OMSCS) are typically older; in their mid-thirties (M = 33.8) and in mid-career (Goodman et al., 2019).

Given the older age of online students, it may be more appropriate to assess typical participants using a set of criteria common to "non-traditional learners" (Wladis, Hachey, & Conway, 2015) or more appropriately, "adult learners" (Money & Dean, 2019). This group of older students is more likely to be employed, have dependents, and are often returning to education after a prolonged absence (Money & Dean, 2019; Wladis et al., 2015). Wladis et al. (2015) found that each additional non-traditional characteristic (delayed or part-time academic enrollment, having dependents, full-time employment, etc.) was associated with a higher likelihood of enrolling in an online course across all disciplines, and that the effect was stronger for STEM majors than for non-STEM (when one non-traditional characteristic was reported, odds ratio was 1.73 for STEM and 1.31 for

non-STEM; when five non-traditional characteristics were reported, odds ratio was 4.14 for STEM and 2.82 for non-STEM).

1.2.2 Self-Regulated Learning in the Online Context

As described earlier, the current literature typically discusses three levels of SRL strategies, ranging from selection and coordination of cognitive strategies for information processing to management of goal-relevant resources (Boekaerts, 1999; Pintrich, 1999). The bulk of research on SRL strategy use has focused on micro-analytic processes (i.e., those related to the first level of SRL) in traditional face-to-face education. These include, for example, cognitive strategies for retaining information, with less discussion of 'macro' self-regulatory strategies for learning (i.e., those related to the third level of SRL) such as allocating effort and resources to achieve some learning-related goal (for reviews on this topic, see Boekaerts, 1999; de Boer, Donker-Bergstra, & Kostons, 2012; Dent & Koenka, 2016; Panadero, 2017; Winne & Hadwin, 2010). SRL measurement has followed this trend, with a heavy focus on behaviors that may be more relevant to students enrolled in in-person degree programs than to those enrolled in online degree programs (Broadbent & Poon, 2015). As a result, measures that have been shown to be valid for K-12 and collegiate populations may fail to capture important aspects of SRL strategy use in working adults. Two examples of this issue in popular SRL measures are briefly discussed below.

The Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1993) assesses SRL strategies in a traditional (in-person) educational context and is by far the most popular measure of self-regulated learning (Honicke & Broadbent, 2016; Roth, Ogrin, & Schmitz, 2016). The MSLQ includes six

scales assessing three motivational traits (value, expectancy, affect) and nine scales assessing three types of learning strategies (cognition, metacognition, resource management) (Pintrich et al., 1993). It was designed for and validated with samples of high school or college students enrolled in face-to-face courses. As such, the measure focuses largely on behaviors that occur in the classroom or while working on assignments (Pintrich et al., 1993). Additionally, several studies failed to replicate the MSLQ factor structure most commonly espoused in the literature (e.g., R. Kanfer, Ackerman, & Heggestad, 1996). More recently, Meijs and colleagues (2019) administered the MSLQ to adults (M_{age} = 38.85) enrolled in distance education courses and also failed to replicate the measure's factor structure.

The Online Self-Regulated Learning Questionnaire (OSLQ; Barnard, Paton, & Lan, 2008) purportedly assesses SRL strategies in online educational contexts. However, its development does not reflect the fact that it is intended for use in online learning environments. Theoretically, the measure is based on Zimmerman's (1998) model of SRL strategies (Barnard et al., 2008), with several items assessing use of each of the six primary strategies proposed by Zimmerman (i.e., goal setting, environment structuring, task strategies, time management, help-seeking, and self-evaluation; 1998). Only a few items (e.g., "Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.") are unique to the online learning context. In addition, like the MSLQ, no items are included that address strategies for managing demands outside the degree program.

Given the differences between face-to-face and online assignments, environments, and populations, extant measures of self-regulated learning may be less valid for adults

enrolled in online graduate degree programs. Although the MSLQ and OSLQ include at least one scale assessing macro-level strategy use (e.g., time management), these items only consider behaviors within the academic domain, such as those relating to studying or test-taking. For working adults in graduate degree programs, outcomes of interest (e.g., academic achievement, retention/graduation rates) are likely to also rely on effective management of obligations outside of the degree program, such as part/full-time work or raising a family (Money & Dean, 2019; Wladis et al., 2015).

Non-work demands are not only time-consuming for adult learners, but also have implications for best practices related to learning management. Assumptions about effective strategy use in adolescents may not translate well to adult learners. For example, the time management subscale of the OSLQ makes an assumption that 'good' time management involves setting consistent daily/weekly times for classwork or studying, which may not be realistic for working adults enrolled in asynchronous programs. Similarly, the relationship between adult learners' performance and the frequency of their SRL strategy use may differ from adolescents as a function of increased non-learning demands (e.g., full-time work, childcare). While frequency of SRL strategy use is typically positively correlated with academic achievement (Dent & Koenka, 2016), one study by Credé & Phillips (2011) suggests that the most highly performing collegiate students may engage in less frequent SRL strategy use (e.g., help-seeking) than their moderately successful peers because they are capable of achieving consistently high grades without active management of the learning process. In contrast, the need to engage in learning management in working adults is posited to not be predicted solely by academic ability. Even the highest performing adult learner, for example, may need to rely on time

management or help-seeking strategies to mitigate the impact of non-learning demands such as a hectic work schedule.

In addition to the impact of lifestyle differences between the typical adolescent/college student and the typical working adult learner, empirical evidence has shown that some SRL strategies have less relative value than others for predicting online (compared to in-person) educational outcomes. In a recent review of self-regulated learning in online education, Broadbent and Poon (2015) found that cognitive strategies such as rehearsal, elaboration, and organization were not significantly related to course grades, despite their established importance in traditional educational achievement.

Nonetheless, self-regulation still plays an important role in online learning. Online students who engage in self-regulatory practices have been shown to experience better achievement outcomes (Shen, Lee, & Tsai, 2007). Consistent with findings for traditional face-to-face courses, Broadbent and Poon (2015) found that strategies such as time management ($r = 0.14$, $p < 0.01$), metacognition ($r = 0.06$, $p < 0.01$), and effort regulation ($r = 0.11$, $p < 0.01$) were positively associated with course grades, although the effects appear weaker in the online context (r ranges from 0.06-0.14, compared to 0.18-0.32 for the equivalent investigation of face-to-face courses). These smaller effects have several potential explanations. It could be that current validated measures are less appropriate for use outside of the face-to-face context, or that other factors related to the online learning environment are more strongly related to students' achievement than self-regulation processes (Broadbent & Poon, 2015). Alternatively, perhaps there are some differing characteristics of the student populations (e.g., age) or learning program (e.g., restriction of range on GPA in graduate programs) that are responsible for this difference.

The current project aimed to bridge the gap between research on self-regulated online learning and research on online adult learners by assessing a variety of goal-pursuit strategies employed both in the virtual 'classroom' and at work or home, in order to capture a fuller picture of the working adult's life. A clearer understanding of the nature of SRL strategy use during adult online learning will permit analysis of more macro-level SRL strategies (e.g., continuing to persist despite limited resources in the pursuit of a larger goal such as making a career change) that have been previously shown to predict achievement in online learning contexts (Broadbent & Poon, 2015), and that contribute to lifelong learning and occupational adjustment.

1.3 Current Study

In the current study, I conceptualize SRL as a process where learning management is accomplished by use of multiple strategies (e.g., time management), where the use of a particular strategy might be observed in terms of specific behavioral 'tactics' (e.g., starting assignments ahead of time). A learner's choice of strategies and tactics depends on their learning goal (e.g., knowledge/skill development versus entering a new occupation) as well as the demands (e.g., employment) and resources (e.g., social support) unique to his or her environment. In the current study, qualitative methods (thematic analysis of structured interviews) are used to explore adult learners' SRL strategies and tactics.

The use of structured interviews to identify SRL strategy use is established in the literature. In a series of studies, Zimmerman and Martinez-Pons (1986; 1988) used structured interviews to develop and validate a strategy-based model of self-regulated learning, and to explore the range of unique strategies used by high school students.

Students were asked open-ended questions (e.g., "Do you have any particular methods for preparing for a test?"). Responses (typically one to three sentences in length) were sorted into one of fourteen categories that had been developed a priori (e.g., keeping records and monitoring, seeking social assistance). This protocol and method were further adapted for other early qualitative studies of SRL strategy use in high school students (e.g., Purdie, Hattie, & Douglas, 1996).

Study findings have shown that there are meaningful qualitative differences in the SRL strategies used by students to achieve education-related goals, and that interviews are an effective mean of capturing variance in strategy use (Zimmerman & Martinez-Pons, 1986; 1988). This early qualitative work represented an important first step towards establishing a taxonomy of SRL strategies. More recently, however, quantitative SRL measures such as the MSLQ or OSLQ have become the predominant means of assessing SRL strategy use (Roth et al., 2016), and qualitative approaches have fallen out of favor as the field developed a richer set of theoretical models of SRL which have been well-validated by empirical research. While this is not surprising, it should not preclude use of qualitative methods to study SRL in the context of the current study. No studies exist that have qualitatively examined SRL strategy use among adult learners enrolled in graduate online education programs.

1.3.1 Summary of Research Questions

The primary aim of this study was to assess whether online adult learners rely on SRL strategies beyond those captured by traditional SRL measures, and if so, to explore qualitative themes present in reported strategy use. This study follows the call by

Pandadero (2017), in a broad review of the past several decades of SRL research, for more work exploring the function of SRL processes for adults in work-related training or education. Specifically, Pandadero (2017) argued that the generalizability of current models (which are centered around formal education of children and adolescents) to adult learners should be questioned. As discussed previously, successful adult learners must effectively manage competing demands (Money & Dean, 2019). For example, relevant time management strategies might expand to include issues like balancing time spent learning and at work.

I expect that OMSCS students will report specific SRL strategies and tactics not captured by items on popular measures of SRL (i.e., MSLQ, OSLQ). As such, these findings aimed to provide initial empirical evidence to support the augmentation of existing models and the development of new SRL measures for adult, online learners. I conducted standardized interviews with a sample of online adult learners enrolled in a graduate computer science program in order to answer the following questions:

1) What are the specific SRL strategies and tactics used by adult online learners, and how are these strategies and tactics used for learning management?

2) Does the current state of the SRL literature capture all learning strategies employed by adult online learners, or should extant models be augmented to include learning strategies relevant to this population?

CHAPTER 2. METHOD

2.1 Participants and Sampling

Participants were sampled from Georgia Tech's OMSCS program. Out of all enrolled U.S. citizens from 2014-2016, the average age was 33.0 years, with a majority male (89%) population, and 92% of students were employed either full- or part-time (Goodman et al., 2019). Three criteria for participation in this study were as follows: (1) participant is actively enrolled in the program, (2) participant does not reside in the European Union, and (3) participant is greater than 18 years of age. Sampling frames (from which participants were randomly selected) were constructed from a list of all OMSCS students who were enrolled in 2019 Spring semester courses. In the first step, all students who did not meet the eligibility criteria were excluded. In the second step, remaining students were stratified into one of six sampling frames based on age (25-34, 35-44, 45-54) and gender (male, female). The creation of these six frames ensured that students of varying age and gender were adequately represented in the study (older students and women are underrepresented in program enrollment).

Participants were contacted through email and invited to participate in an hour-long interview study. Potential participants were contacted in waves, with the study goal of yielding at least 10 interviews for each of the six frames. A total of 809 individuals were contacted across all sampling frames. Ninety individuals (11.13%) agreed to participate in the study. Fifteen of these individuals cancelled before data collection took place, for reasons including schedule conflicts (e.g., participant cited busy work schedule) and ineligibility (e.g., participant was currently residing in the European Union). Seventy-five

interviews (9.27%) were successfully completed (53.33% male, 46.67% female, M_{age} = 38.4, SD_{age} = 8.67). **Table 2** provides more detail on the distribution of gender and age groups in the study sample.

Table 2. Age and Gender Distribution of the Study Sample

Group	N	%
Women		
25-34	12	16
35-44	14	18.67
45-54	9	12
Total Women	*35*	*46.67*
Men		
25-34	16	21.33
35-44	10	13.33
45-54	14	18.67
Total Men	*40*	*53.33*
Total Interviews	**75**	**100%**

2.2 Materials and Data Collection

The interview protocol was developed in Spring 2019 by an interdisciplinary research team comprised of two faculty members and three doctoral students from psychology and public policy. The protocol was designed to cover a range of learning and work-related topics, and integrated open-ended questions about behaviors, motivation, and experiences both prior to and during enrollment in the degree program. For ease of presentation, the final protocol was divided into six sections: 1) personal background (e.g., educational background), 2) decision to apply and enroll (e.g., influence of social network on decision to enroll), 3) OMSCS program experience (e.g., strategies for managing coursework), 4) program communication (e.g., interaction with OMSCS peers and instructors), 5) challenges and work-life balance (e.g., strategies for managing challenges

or conflict), and 6) closing thoughts (e.g., doubts about program). The full interview protocol is provided in **Appendix A**.

Following finalization of the protocol content, the full protocol was pilot tested among the interviewers. To allow interviewers to receive feedback from the rest of the team on their interviewing behaviors (e.g., reminders to not ask leading questions), each interviewer took turns roleplaying the interviewer and the participant. Each interviewer then conducted one interview with a member of the Student Advisory Board for the OMSCS program. Members of this board had previously agreed to assist as needed on the content of the study materials. As these interviews were conducted for the purpose of testing the interview protocol and providing interviewers with practice, none were recorded or used in subsequent analyses.

The 75 participant interviews were conducted during the period between June 2019 and August 2019 by the three doctoral students on the research team. All interviews were conducted using BlueJeans video conferencing software. To address privacy concerns, all participants were provided the option of completing the interview with or without their camera turned on. After interview completion, the file was saved as an audio recording, and all audio was transcribed by an external service (CaptionSync). Interview lengths ranged from just under 24 minutes to 1 hour and 8 minutes, with an average length of just under 44 minutes (43:59).

2.3 Analyses Overview

Coding of the interview data was performed in nVivo (QSR International, 1999) by the same three doctoral students that conducted the interviews. nVivo is a software package

that assists in qualitative data analysis by allowing researchers to assign chunks of text to different 'codes,' compare consistency between coders, and produce reports on frequency of codes within the data in order to help identify potential themes. While these reports do not identify substantive themes themselves, they are helpful in guiding analysis and interpretations that are grounded in the data. I chose thematic analysis (for in depth reviews of this methodology, see Braun & Clarke, 2006; Kuckartz, 2014) as my primary method of qualitative analysis. While other qualitative methods (e.g., content analysis) allow for organization of text into meaningful categories and descriptive analysis of those categories, thematic analysis goes further by allowing researchers to retain and summarize rich meaning both within and across categories (i.e., development of themes) (Kuckartz, 2014). Thematic analysis can therefore be more deeply informed by existing theory and is better suited to my research questions.

Interview data analysis occurred in two successive stages. As recommended by Kuckartz (2014), I used approximately 15% of the interviews (10 out of 75, randomly selected) as test data in the first stage to develop a coding protocol and establish evidence of intercoder consistency. In the second stage, I used the remaining interview data (N = 65) to perform three sets of analyses: 1) checking for interviewer effects on coding frequency, 2) thematic analysis of SRL strategies, and 3) exploratory analysis of gender and age differences in SRL strategy use. Specific procedures and methodology for each set of analyses are described in their respective results subsections below.

CHAPTER 3. RESULTS

3.1 Stage One

Approximately 15% of the interviews (i.e., 10 of 75) were selected at random to be used as 'test' interviews in accordance with recommendations from the qualitative methods literature (Kuckartz 2014; Levitt et al., 2018). This process consisted of three stages (described below and summarized in **Figure 1**) in which the randomly selected test interviews were coded by all three coders at varying levels of specificity. Stage 1A included all test interviews, while Stages 1B and 1C each used five of the ten test interviews.

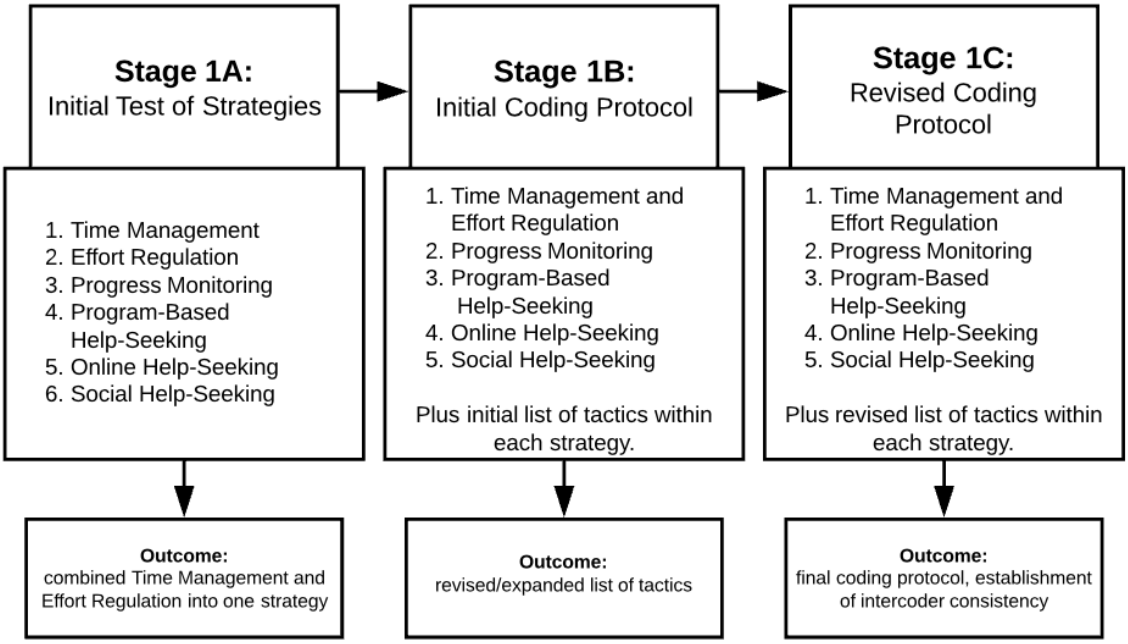

Figure 1. Stages of Coding Consistency Check

3.1.1 Coding Protocol Development

In Stage 1A, participant reports of SRL strategy use were coded into one of six primary strategies: Time Management, Effort Regulation, Self-Monitoring, Program-

Based Help-Seeking, Online Help-Seeking, and Social Help-Seeking. Time Management and Effort Regulation were combined in subsequent stages into one strategy due to persistent double coding.

In Stage 1B, initial sets of specific tactics were developed a priori for each strategy based both on prior work (e.g., a sample tactic taken from the OSLQ refers to 'keeping a consistent schedule or calendar') and coder suggestions (e.g., 'asking coworkers or family to pick up slack at work/home'). Exemplar tactics associated with each strategy are shown in **Table 3.** Example Tactics Within SRL Strategies. After identifying this preliminary list of tactics, half of the test interviews were coded at the tactics level. In addition, an 'Other' code was included for each strategy, and coders were instructed to keep track of tactics that they felt were missing from the protocol.

In Stage 1C, the specific tactics for each strategy were revised and expanded based on findings from Stage 1B. The revised protocol was used to code the second half of the test interviews. Completion of Stage 1C resulted in a final protocol comprised of 27 tactics distributed across 5 strategies. A complete list of tactics within each strategy is provided in **Appendix B**.

Table 3. Example Tactics Within SRL Strategies

Strategy	Example Tactic
Self-Monitoring	Make judgments about past effort
Time Management and Effort Regulation	Keep a calendar or schedule
Program-Based Help-Seeking	Interacting with instructors or TAs
Online Help-Seeking	Searching for technical help online
Social Help-Seeking	Ask spouse or family to pick up slack

3.1.2 Intercoder Consistency

I calculated indices of coder consistency after each of Stages 1A-1C. Prior to beginning the next stage, group coding meetings were held in order to review the results of the consistency check, discuss observed discrepancies between coders, and resolve any disagreements. NVivo provides several options for calculating coder consistency, including percent agreement and kappa coefficient. Percent agreement refers to the percent (in terms of words per transcript) of text that was coded by all coders. While it is easily calculated and interpreted, a substantial downside to using this metric is that in texts where large chunks are expected to go uncoded, relying only on percent agreement can result in spuriously positive assessments of coder consistency (Hayes & Hatch, 1999; Stemler, 2004). This was of particular concern to the current study because the interview protocol contained tangential questions on enrollment decisions, course experiences, and other topics not directly germane to SRL strategy and tactic use in the program.

For this reason, I assessed coder consistency using the kappa coefficient (Landis & Koch, 1977). This index assesses agreement between multiple coders on a scale from -1

to 1 and is corrected for chance. Like other reliability indices, there is no one given boundary above which kappa is considered to be unilaterally 'good' (Brennan & Silman, 1992; Rigby, 2000), and various aspects of the study may influence observed scores. For example, all else being equal, more complex coding protocols or a larger number of coders (above the minimum of two) will be associated with lower values of kappa (Maclure & Willett, 1987). This said, however, Landis and Koch (1977) propose a benchmark system where 'poor' agreement between coders is defined as observed kappa coefficients below zero; 'slight' agreement as coefficients between 0.00 and 0.20; 'fair' agreement as 0.21 to 0.40; 'moderate' agreement as 0.41 to 0.60; 'substantial' agreement as 0.61 to 0.80, and 'almost perfect' agreement as above 0.80. With three coders and a fairly complex coding protocol, especially in Stages 1B and 1C, I set a target kappa coefficient of 0.40 for each SRL strategy.

Because NVivo only allows for comparison between two coders or groups of coders, I calculated three consistency checks for each stage: Coder 1 versus Coders 2 and 3; Coder 2 versus Coders 1 and 3; and Coder 3 versus Coders 1 and 2. I then calculated the average of these three scores for each of the SRL strategies included in the protocol. The final results of the coding consistency check are summarized in **Table 4.** As shown in Table 4, with the exception of Self-Monitoring, coding consistency for all strategies was well above the target kappa value of 0.40 by the end of Stage 1C. In the case of Self-Monitoring, the decision to continue with interview coding rather than complete an additional stage of training was made given that 'fair' agreement was still reached. After further discussion with the other coders as to disagreements within the Self-Monitoring strategy, I provided

a manual with examples relevant to common coding mistakes in this and other strategies. An abridged version of this manual is provided in **Appendix C**.

Table 4. Kappa Coefficients for Coding Consistency

	Self-Monitoring	Time Mgmt	Effort Regulation	Program-Based Help-Seeking	Online Help-Seeking	Social Help-Seeking
Stage 1A	0.2190	0.6383	0.4033	0.3273	0.4780	0.3760
Stage 1B	0.2998	0.5488	[a]	0.5804	0.5751	0.4544
Stage 1C	0.2783	0.5693	[a]	0.5688	0.6055	0.5278

a: After Stage 1, the strategies of Time Management and Effort Regulation were combined. Kappa values are subsequently reported together under the 'Time Management' column.

3.2 Stage Two

3.2.1 Effect of Interviewer on Coding Frequency

Because the interview data were collected by three rather than one interviewer, it is possible that interviewers may have had an effect on the frequency with which participants reported using SRL strategies. To assess this possibility, I conducted five one-way ANOVAs with interviewer as the independent variable and each of the five strategies as the dependent variable. The results of these analyses, summarized in **Table 5**, show that there was a significant effect of interviewer on coding frequency for two out of the five strategies (Self-Monitoring and Program-Based Help-Seeking). Post-hoc analyses of these two strategies indicated that interviews conducted by one of the three doctoral researchers contained significantly more references (an average of 1.6 and 2.5 additional references per interview respectively) than those conducted by the other two researchers. Since some descriptive analyses involve comparison of average or total references across strategies, it is important to consider the possibility that factors other than actual frequency of strategy

use may have influenced the total number of coded references. Based on the available information, I cannot conclude whether or not the significant effects observed here were due to interviewer behaviors (e.g., additional probing of participants) or other inconsistencies in methodology. However, because I randomly assigned interviews for coding purposes, and because the conclusions drawn from thematic analysis do not rely solely on quantitative differences in coding frequency, it is reasonable to infer that the effects described here likely did not impact the coding process or the subsequent analyses in meaningful ways. Additionally, the effect sizes for significant effects are relatively small (an average of 1.6 and 2.5 additional references per interview). These findings, therefore, do not necessarily cast doubt on the qualitative themes that emerged from the interviews.

Table 5. One-Way Analysis of Variance of Coding Frequency by Interviewer

	SS	*df*	MS	*F*	*p*
Self-Monitoring					
Between	20.774	2	10.387	4.986	0.010*
Within	129.164	62	2.083		
Total	149.938	64			
Time Management & Effort Regulation					
Between	71.542	2	35.771	3.024	0.056
Within	733.320	62	11.828		
Total	804.862	64			
Online Help-Seeking					
Between	7.871	2	3.936	2.825	0.067
Within	86.375	62	1.393		
Total	94.246	64			
Program-Based Help-Seeking					
Between	62.409	2	31.204	9.317	0.000*
Within	207.653	62	3.349		
Total	270.062	64			
Social Help-Seeking					
Between	30.417	2	15.209	2.338	0.105
Within	403.367	62	6.506		
Total	433.785	64			

*: significant at 0.05 level

3.2.2 Thematic Analysis

Kuckartz (2014) offers several methods for analyzing and presenting the results of qualitative thematic analysis. Given the goal of this study (to capture the universe of self-regulation strategies used by adult online learners). I employed three of Kuckartz' (2014) thematic analysis methods for the current study; namely (1) Descriptive analysis of the main categories (i.e., strategies), (2) Analysis of relationships within a main category (i.e., strategy), and (3) Graphical representations and visualizations. The first two methods and

associated findings are described below. I used the third method (graphical representations) throughout the following sections to supplement interpretation of written analysis.

Kuckartz (2014) recommends a descriptive analysis across strategies as the first step in thematic analysis. As described in the stage one analyses, participants reported five primary SRL strategies. Each is briefly defined below. Descriptive statistics (total frequency of references and percent of participants reporting strategy use) are provided for each, and the frequencies are shown in **Figure 2**.

Time Management and Effort Regulation was the most frequently referenced strategy (N = 582), with 100% of participants referencing at least one tactic within this strategy and an average of 8.95 references per participant. Broadly, this strategy captured participants' tactics for allocating time and effort across demands from the OMSCS program, their personal or family lives, and employment.

Social Help-Seeking was the second most frequently referenced strategy (N = 417), with 100% of participants referencing at least one tactic within this strategy, and an average of 6.42 references per participant. This strategy refers to tactics in which learners actively sought help from people other than their instructors or TA's (e.g., OMSCS peers, spouses, other family members, coworkers, and friends). Often, participants used this strategy to seek out technical assistance (i.e., help with difficult assignments), but other common purposes included seeking help with decision-making (e.g., course enrollment or withdrawal decisions) as well as management of non-learning demands (e.g., childcare).

Program-Based Help-Seeking was the third most frequently referenced strategy (N = 211), with 95.4% of participants referencing at least one tactic in this strategy, and an

average of 3.25 references per participant. The Program-Based Help-Seeking strategy captured help-seeking from resources that were 1) officially a part of or associated with the OMSCS program, and 2) not social in nature, except for instructors and TAs (i.e., did not involve some form of interaction with OMSCS peers or social contacts outside of the program, either virtually or in-person).

Self-Monitoring was the fourth most frequently referenced strategy (N = 102), with 67.7% of participants referencing at least one tactic in this strategy and an average of 1.57 references per participant. Participants reported using this strategy to assess whether they are making satisfactory progress towards achieving program-related goals and evaluate whether the strategies and/or tactics they are currently using are adaptive. If they evaluate current efforts as being unhelpful for goal progress, then they may 'switch course' by employing different strategies and/or tactics in the future.

Online Help-Seeking was the least frequently referenced strategy (N = 97), with 76.9% of participants referencing at least one tactic within the strategy and an average of 1.49 references per participant. The Online Help-Seeking strategy captured help-seeking from resources that were 1) not officially associated with or sanctioned by the OMSCS program, and 2) not social in nature (i.e., did not involve some form of interaction with others, either virtually or in-person).

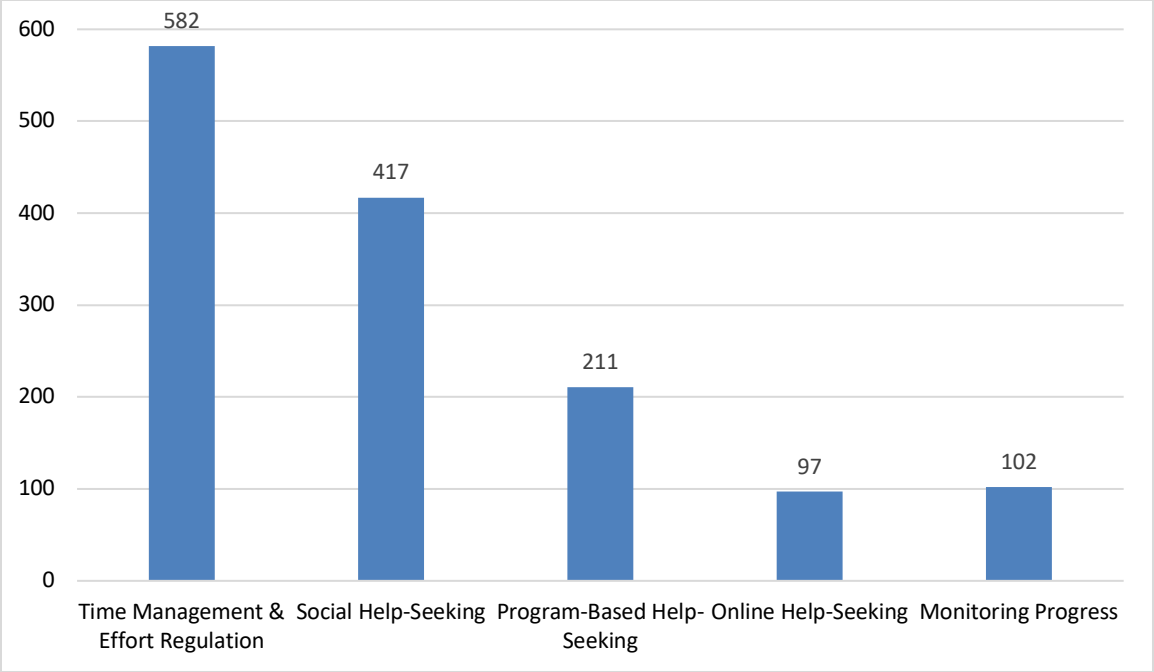

Figure 2. Frequency of SRL Strategy References

Next, I assessed tactics reported within each strategy in order to summarize the range of tactics across participants as well as patterns or relationships that emerged between tactics. Rather than presenting descriptive summaries for all tactics individually, I summarized thematic findings of theoretical importance within each strategy to see if there were common themes between sets of tactics that might simplify interpretation of the results. This approach allowed me to synthesize common themes across diverse tactics in this strategy and summarize important patterns of behavior within my sample. Within the two most frequently referenced strategies (Time Management and Effort Regulation; Social Help-Seeking), I grouped tactics into three conceptually similar sets per strategy. Within the remaining strategies, I summarized thematic findings of importance for the most frequently referenced strategies. A summary of tactics discussed in these remaining

thematic analysis sections is presented in **Table 6**, and results are reported in more detail below.

Table 6. Tactics and Tactic Sets Reported in Thematic Analysis

Strategy	Tactics Discussed
Time Management and Effort Regulation	• A priori time management tactics • Approach-oriented coping tactics • Avoidance-oriented coping tactics
Social Help-Seeking	• Virtual help-seeking from OMSCS peers • In-person help-seeking from OMSCS peers • Help-seeking from family, friends, or coworkers
Program-Based Help-Seeking	• Interacting with instructors or TAs • Accessing or using lectures or notes • Using OMSCS administrative resources
Online Help-Seeking	• Searching for technical assistance online • Using unofficial course sites
Self-Monitoring	• Evaluating progress • Making judgments about past effort • Switching strategies and/or tactics

3.2.2.1 Time Management and Effort Regulation

After coding all interviews, 13 unique tactics emerged within this strategy. These tactics and their respective frequencies are shown in **Figure 3**. As described above, I organized the 13 tactics into three sets ('a priori management' tactics, 'avoidance coping' tactics, and 'approach coping' tactics) that shared important characteristics. In the discussion below, I define these sets of tactics, explain the distinguishing characteristics of each set, and provide examples of participants' tactic use.

A priori management tactics refer to proactive actions through which the individual strives to manage the allocation of his or her time or effort. Such tactics can be further

distinguished by whether they are tactics for allocating time and effort within a learning task (e.g., 'estimating time required for a task' or 'breaking a task into component parts') or across learning and non-learning demands (e.g., 'setting priorities' or 'keeping a calendar/schedule'). The common characteristic tying these tactics together is that they involve some form of proactive temporal planning prior to beginning work on a task. An important point made by participants while discussing these tactics is that the outcome (i.e., whether the plan unfolds as intended) is perhaps less important than the action of planning in general. By facilitating thought about the resources and work that will be necessary to complete tasks, these tactics aid in development of means-end plans for achievement of longer-term goals (Bandura, 1988) and make it easier for the learner to accommodate last-minute changes. For example, consider the tactic 'starting assignments ahead of time'. As one participant stated: "…week to week, it's kind of hard, unless you get ahead. So long as I stay ahead, then I build up a buffer of a week or two where if things happen, I can accommodate that."

In contrast to a priori management tactics described above, coping tactics do not involve advance planning, but rather activities undertaken in response to an experienced difficulty or obstacle, either in OMSCS-related work (e.g., an assignment being more difficult than expected) or in dealing with demands at work or home. Of particular note is that these tactics were reported as being useful across a variety of situations. To provide more precision in my interpretation of coping tactics, I applied an approach/avoidance action framework, where coping tactics were reported as intentions to either 1) proactively deal with a stressor (approach) or 2) reduce the negative impact of a stressor by distracting

oneself or withdrawing from the threat (avoidance - for a review of this framework, see Roth & Cohen, 1986).

Approach-oriented coping tactics involve responding to an obstacle by allocating more time or effort to it. In some cases, this was accomplished by reallocating time to coursework that would otherwise be spent on non-learning demands (e.g., home or work). Generally, participants were more willing to take time from home than work (see **Figure 3** for respective frequencies). There was also notable variation in the extent to which people were willing to take time from work. Some participants reported taking time from work only as a last-resort tactic, while others reported using doing so more frequently or in more casual circumstances. When participants were unable to take significant amounts of time from non-program demands, alternative approach coping tactics included 1) making better use of small periods of 'down time' (e.g., lunch breaks, commutes) to chip away at smaller tasks, and 2) increasing the level of concentration or effort given to the task during available time.

In contrast to approach-oriented coping, avoidance-oriented coping tactics involve responding to a program obstacle by taking action to reduce task demands, either in terms of workload or perceived stress associated with tasks. Examples of such tactics include 'Adjusting or lowering course load', 'Decreasing standard of performance', and 'Temporarily stepping away from a task'. Participants who used tactics to reduce task demands tended to describe situations where they recognized they had taken on too much coursework, causing their performance to suffer. But where an approach coping tactic might involve reallocating time from another domain or increasing one's concentration, participants who used avoidance coping tactics reduced demands by withdrawing from

courses or lowering their standard of acceptable performance (e.g., “It's sort of like okay, the time invested to get an A versus the time invested to get a B, sometimes you have to make that call.”). Importantly, participants reported that use of these tactics was usually not related to an inability to understand the content of OMSCS-related work; rather, it was an intentional decision made based on the fact that time is a critically limited resource. For example, one participant with a very demanding job stated that: “It's not about not being able to understand [the class material] … Two semesters it happened that I registered for two classes. And I became so time constrained that I had to drop one of those.” Participants also reported using avoidance coping tactics in order to manage stress associated with OMSCS-related tasks. In these instances, the purpose of the tactic was not to directly aid task completion, but to indirectly facilitate task completion by creating a more supportive environment. For example, the following participant reported that when she is struggling with a difficult assignment and is no longer making progress, she finds it useful to switch tasks and complete some other (simpler, but necessary) work: “…now you feel good about getting something done, because that's less stress… But sometimes you just have to shift gears if you're getting stuck on something or if you are, you know, a little drained on thinking of the same thing.”

Overall, the interview findings show that time management and effort regulation is a major strategy in online adult self-regulated learning. Analysis of participants’ references to time management and effort regulation tactics suggests that tactics can be classified as either a priori management (planning) or coping. The findings further reflect a shared belief that the value of these tactics is a function of non-learning demands; that is, higher non-learning demands increase the utility of time management and effort regulation. Childless

participants in particular tended to recognize that their relative lack of caregiving responsibility significantly reduced the necessity of using time management tactics: “I also don't have kids or a wife, or you know, a partner or what not. So, it's pretty easy for me to dedicate time to the program.” In addition to acknowledging non-learning demands and associated tactics to address these demands, participants also frequently reflected on how the specifics of their lived experience impacts the amount of time devoted to the degree program. A poignant example of this point was provided by the following participant as he explained the relegation of OMSCS-related tasks to a lower priority given family issues: “While I want to do my best, my priorities still need to lie with my real job, and you know, my family. … If I would have sat [at the computer] for 12 hours, then it would have meant my 39-week pregnant wife would deal with 100 degree heat.” Comments like these are consistent with prior research suggesting that for adult learners, being able to manage demands outside the academic program is central to self-regulation of learning (Money & Dean, 2019; Wladis et al., 2015).

Additionally, examination of tactic frequency within this strategy (as shown in Figure 3) seems to suggest that participants may have tactic preferences that hold constant across different contexts. The most frequently referenced tactic was keeping a calendar or schedule (N = 94), followed by starting tasks ahead of time (N = 69), and setting priorities (N = 66). In contrast, less popular tactics reported by the sample were those which required more drastic forms of action: that is, those with more significant consequences for goal progress (e.g., lowering course loads, N = 47), academic performance (e.g., lowering standard of performance, N = 20), or household finances (e.g., outsourcing household tasks, N = 4). Taken together, this pattern of results suggests that adult learners may prefer

the use of a priori management tactics when possible and the use of coping tactics as a secondary approach only when obstacles arise.

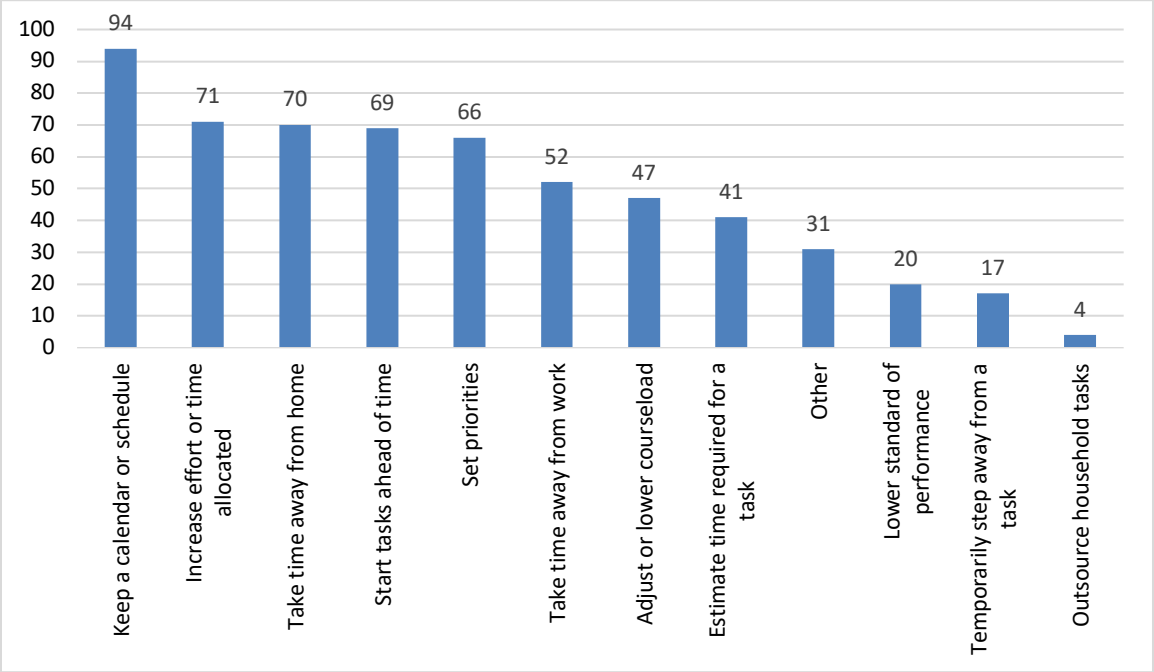

Figure 3. Frequency of Time Management and Effort Regulation References by Tactic

3.2.2.2 Social Help-Seeking

Eight distinct tactics were identified in this strategy and are shown along with their respective frequencies in **Figure 4**. As I did for the time management and effort regulation strategy, I identified three groups of tactics within this strategy: (1) Virtual help-seeking from OMSCS peers, (2) In-person help-seeking from OMSCS peers, and (3) Help-seeking from family, friends, or coworkers. Each is defined below, then reviewed for its defining characteristics and themes.

Virtual help-seeking tactics refer to seeking out help from fellow OMSCS students on both program-sanctioned digital class platforms (e.g., Piazza) as well as unofficial

platforms (e.g., Slack). Accordingly, reported tactics include 1) 'using official discussion boards' and 2) 'using unofficial discussion boards'. These platforms were extremely popular among participants and were the first and second most frequently reported tactics within the Social Help-Seeking strategy (N = 136, N = 98 respectively). Although participants reported small differences between the two classes of platforms (e.g., responses are typically faster on Slack, but more detailed and easily searchable on Piazza), both platforms tended to serve similar purposes overall.

Nearly all participants who reported using these platforms explained that they do so to seek out help on challenging assignments or other specific advice related to coursework. When participants were asked how they would manage a coursework-related obstacle or challenge, they often reported that these platforms were one of their first options for seeking out help. In addition to seeking out technical help, they might also use this resource for help in implementing time management tactics: "I just Slack and Piazza to figure out [how long a project will take] mostly … Everyone always wants to know because we're all trying to do the same thing, balance family life and work life."

Participants' comments about these platforms also frequently included strong reactions to the large volume of available information. Because online course sizes can be far larger than the equivalent in-person section, a discussion board might have hundreds of enrolled participants. Participants reported that as a result, there tends to be an extremely large amount of information coming through each day, especially on the less moderated Slack channels. Combined with a large number of unique users, this results in a "semi-anonymous" environment, where as one participated acknowledged, "probably 99% of the time, I don't actually pay attention to who the poster was or who I'm replying to." This

makes discussion boards both more and less helpful as a potential source of social assistance. While some participants reported that the size of the forums gave them a sense of confidence that high-quality information would always be available, others called the fast-paced nature "overwhelming" or "intimidating". In fact, among those who reported that they did not use discussion boards to seek out help (or did so only occasionally), this sense of "intimidation" was an important factor in that choice. Similarly, other participants indicated that the large volume of responses made it too difficult to find relevant information.

In-person help-seeking tactics from OMSCS peers refer to solicitation of help from OMSCS peers in person, either in one-to-one interactions or in small groups. While the primary function of virtual help-seeking was moving past coursework-related challenges, participants often reported using in-person help-seeking to ask peers for advice on choosing courses, and broader advice for succeeding in in the program in general. These contacts might be part of participants' broader social networks, but they are also concurrently enrolled in OMSCS. For example, one participant realized after joining the program that a coworker was also enrolled and asked that coworker for advice on managing learning demands: "I did ask him his execution and strategy for being successful in the program because I knew he was very competent and smart." In contrast to virtual help-seeking, which was described by one participant as "semi-anonymous", participants typically drew upon OMSCS students in their existing social networks for this type of help. As a result, those whose social networks contained more individuals likely to enroll in OMSCS (e.g., participants who work in a job related to CS), were more likely to report use of this tactic.

A small number of participants reported seeking out help or connections through in-person study groups, but this was an infrequent occurrence.

Help-seeking tactics from family, coworkers, or friends involve seeking help from social contacts who are not associated with the OMSCS program. Generally, there was meaningful variance in both the amount and types of help that participants reported soliciting from each area of their social network (i.e., family, coworkers, or friends). Of the three groups, family members (including spouses) were most frequently referenced as sources of help. Spouses in particular were referenced as providing tangible help by taking over time-consuming tasks such as cooking or childcare, as well as helping participants make decisions (e.g., whether to withdraw from a course) that affect their progress in the program. Several participants cited this support as a critical factor in their continued ability to perform well in OMSCS. For example, one participant explained that by taking over most night-time and weekend childcare, his wife "really makes it possible for me to even do the program". Friends provided this type of support less frequently, although several exceptions were noted. For example, one female participant reported that she had a close-knit "community of moms" who were essential sources of support for managing childcare.

More often, participants reported relying on friends or coworkers with technical skills as a resource when struggling with coursework. When participants reported seeking out coworkers for help, it was usually related to coursework-based challenges. For example, participants might approach a knowledgeable coworker for help with an unfamiliar programming language or to interpret a confusing paper (in the coworker's area of expertise). Like seeking technical help from OMSCS peers, doing so from friends or coworkers outside of OMSCS is dependent on having a social network with the relevant

skills. Participants who work in a job relevant to CS often reported using this tactic, likely because they may have more access to coworkers or friends with relevant expertise.

However, access to skilled peers didn't always mean that learners would take advantage of these social resources; participants also varied widely in their willingness to approach coworkers for help. Some did so only as a last resort because they considered it unprofessional to discuss non-work matters on the clock, while others frequently had program-related conversations at work. One notable example of the latter was a manager who explained that when he was struggling with a particular concept in his courses, he would call in team members for meetings to discuss the issue. He reported that as a result of the diverse technical skills present on his team, that he could "… pick a topic and I've got some expert or some really knowledgeable SME [subject matter expert] around on the topic. So typically, I pull them in for a discussion of that topic area if I feel like I need some advice."

Analysis of participants' references to Social Help-Seeking tactics suggests that these tactics can be classified as 1) virtual help-seeking from OMSCS peers, 2) in-person help-seeking from OMSCS peers, or 3) help-seeking from family, friends, or coworkers. Across all tactics within this strategy, four themes emerged. First, online adult learners seek help from a diverse range of social connections both inside and outside of their degree program, including fellow students, coworkers, family, and friends. In addition, participants in the current study reported that these social connections provided unique types of assistance. Spouses and family members, for example, might help to manage non-learning demands (e.g., childcare) or provide emotional support. Coworkers and OMSCS peers were more likely to be cited as a source of technical assistance or program-related

advice (e.g., course enrollment decisions). Friends seemed to act as a middle ground between these two, offering course-related support or other forms of assistance depending on their unique circumstances. The final two themes reflect differences in the extent to which participants have access to and are willing to use social resources. In the former case, differences in access to social resources are most evident when considering technical ability. For example, participants with an extant career in CS seem to be more likely to have access to coworkers or friends who can provide technical and program-related assistance. In the latter, some participants reported that concerns about appearing incapable or unprofessional prevented them from seeking help from OMSCS peers or coworkers respectively.

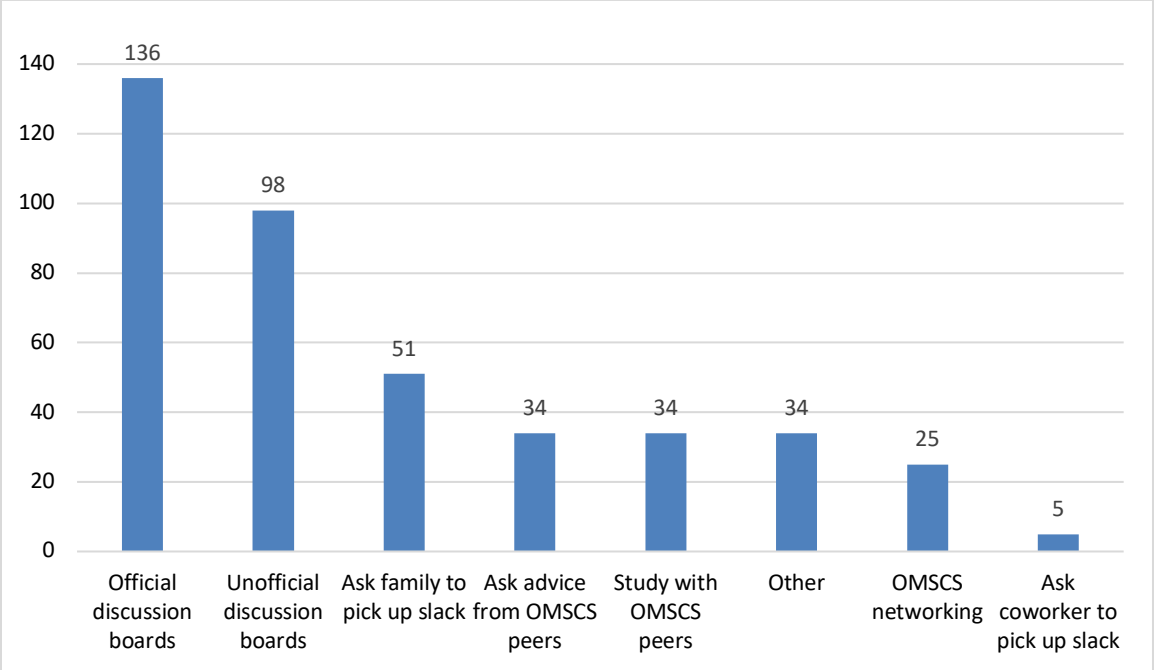

Figure 4. Frequency of Social Help-Seeking References by Specific Code

3.2.2.3 Program-Based Help-Seeking

As shown in **Figure 5**, the two most popular tactics in this strategy were 'interacting with instructors or TAs' and 'accessing or using lectures or notes'. There were relatively few unique tactics reported in this strategy compared to other strategies (e.g., time management and effort regulation), although use of tactics was more variable within participants. This variability is likely due to the fact that resources such as instructor assistance are sought out on a more infrequent basis (e.g., preparing for exams, completing particularly difficult assignments) instead of as a consistent habit throughout semesters or across classes. For example, a participant who reported managing his or her time by starting assignments early was likely to do so regardless of course demands, but a participant who reported seeking help from a TA typically did so only when struggling with assignments or course material. As might be expected, those who had higher familiarity with the subject matter or who generally perceived that a course was not difficult used these resources less often than those less familiar with the material or who perceived that a course was highly difficult. Courses were associated with varying levels of difficulty, and participants reported that this influenced the likelihood that they utilized resources such as office hours or other instructor aid TAs (e.g., ad hoc technical assistance).

Interestingly, course difficulty does not seem to be the most critical factor in predicting whether students seek help from instructors. Instead, instructor availability seemed to matter more, especially when considering participants' interaction with instructors of record. For some participants, instructors' online presence (or lack thereof) directly influenced the frequency of their interactions with instructors, with one participant reporting that "As much as they interact with us, we interact with them.". He describes a wide range of instructor presence, from those who "never said a word" to those who

regularly participated in discussion forums and other informal communication with students.

The vast majority of references to use of this strategy referred to participants' help-seeking or use of resources within a particular course. However, a small but meaningful subset of participants (N = 8, 12.31%) reported that they had been in contact with the program administrators in some capacity. These references primarily show a pattern of reaching out for higher-level assistance during unusual circumstances, such as seeking accommodations for an injury, illness, or disability.

Common tactics within this strategy included seeking help from instructors and reviewing course material. Consistent with findings discussed thus far, participants reported that non-learning demands influenced their use of the former tactic. For example, one participant explained that his typical work schedule reduced the frequency of his synchronous interactions with instructors or TAs: "It's a little rare that I'm actually able to make the office hours time due to the timing on different work schedules." In this sense, Program-Based Help-Seeking tactics continue to reflect ways in which online adult learners' SRL tactic use might differ from that of younger or residential learner populations. However, it is important to note that use of this strategy as a whole seems to be predicated on course-related factors. That is, participants are unlikely to pursue instructor assistance in courses where the instructor is perceived to be unavailable, or to engage in either tactic if course difficulty is sufficiently low.

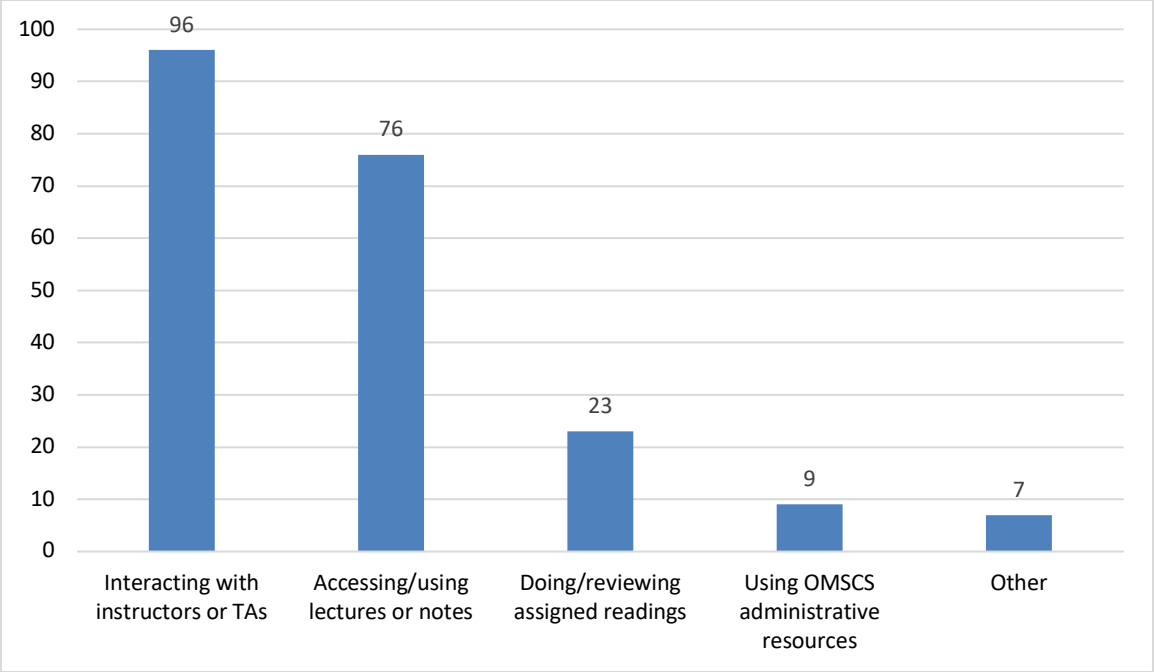

Figure 5. Frequency of Program-Based Help-Seeking References by Tactic

3.2.2.4 Online Help-Seeking

Two primary tactics, 'searching for technical help online' and 'using unofficial course sites' emerged in this strategy and can be seen along with their respective frequencies in **Figure 6**. Findings relevant to each of these tactics are discussed below.

When respondents were asked how they handled course-related obstacles, such as working past general difficulties with assignments or attempting to understand challenging conceptual material, they often reported using general internet searches or relying on websites unrelated to OMSCS (such as Stack Overflow or other programming blogs) for insight. Generally, participants consider these search tactics to be consistently important to their success in completing assignments and doing well in courses. They typically refer to online searching as a standard approach to dealing with course-related challenges: "The

first thing I do is just go look for external resources. You know, maybe no one in the program has dealt with my specific problem, but I bet you someone online has." Some participants go further and report that these non-program, non-social resources are critically important to their ability to succeed in OMSCS. For example, one participant identified online searching as a tactic without which he may not have been able to complete the program: "So Google has become my best friend. … I don't know how I would handle this master's program if not for Google and the internet, quite frankly. It would be very challenging."

Some participants reported being much more comfortable using online searching tactics compared with official or unofficial discussion boards (tactics within the Social Help-Seeking strategy; e.g., Piazza and Slack), despite the fact that these tactics were almost exclusively used for similar purposes (i.e., technical assistance with coursework). Many participants seemed to view both online resources and discussion boards simply as separate options for supplementing lecture and course materials and would utilize both simultaneously to maximize their chance of finding an answer. However, some reported a tendency to either 1) rely solely on online searching in place of discussion boards or 2) participate in discussion boards only if they had previously spent time searching for answers online. In the former case, one respondent reported that messaging peers on discussion boards was an inefficient use of time, and that she preferred to simply search for information herself. In the latter case, respondents reported a hesitance to appear uninformed in front of peers and used online searching behaviors to check whether they were asking "intelligent" questions. This may be due to an environment on discussion boards that is perceived as unwelcoming. For example, one respondent reported that she

routinely Googles her questions before posting them because “on the discussion boards, if you ask a really dumb question, they’ll tell you.”

The second primary tactic reported within this strategy was using unofficial course websites. These sites are not maintained by OMSCS officials, but rather by current or former students. Unlike the websites mentioned above (e.g., Stack Overflow), which participants reported using to solve difficult assignments or problems, unofficial course websites are primarily used for the purpose of course selection. By far the most popular website, which was referenced by 60% (N = 39) of participants, is a student-run course review page (OMSCentral), which contains both open-ended reviews on the quality of various classes as well as rankings of difficulty and hours of work required per week. Participants often used this resource in conjunction with social resources (e.g., asking friends in the program for advice) as well as time management and effort regulation tactics (e.g., reducing course loads to accommodate busy work schedules) to effectively plan a manageable course schedule.

Online searching for technical help and use of student-run, unofficial course sites comprised the vast majority of references to the Online Help-Seeking strategy. While not every participant reported use of these tactics, those who did often reported that they were critical for learning success (i.e., good academic performance in courses). In addition to this finding, two themes emerged from the analysis of references to tactics within this strategy. First, online searching and unofficial course sites served highly distinct purposes, such that the former provided granular technical assistance (e.g., resolving problems with particular assignments) while the latter functioned as a decision-making aid for course enrollment decisions. Second, some participants reported a preference for online searching

as either a replacement for or precursor to engaging in social tactics for seeking help (i.e., discussion boards). This seemed to reflect either anxiety about more social methods or a belief that they are less likely to provide high-quality assistance.

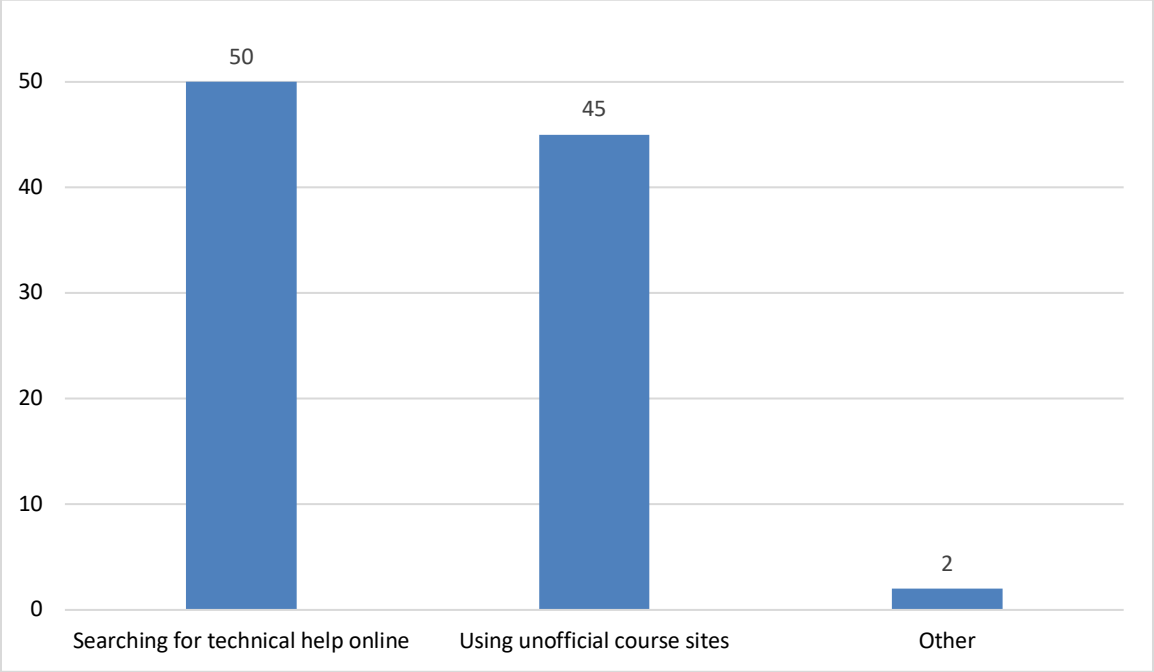

Figure 6. Frequency of Online Help-Seeking References by Tactic

3.2.2.5 Self-Monitoring

Use of the Self-Monitoring strategy is most closely analogous to metacognitive strategies in current SRL models (e.g., Zimmerman & Moylan, 2009), where learners monitor performance over time and adjust strategy use as needed to improve performance. Consistent with these models, Self-Monitoring tactics in the current study can be visualized as a non-restrictive cycle (see **Figure 7**). The 'Self-Monitoring' strategy captured three primary tactics: 1) evaluating progress, 2) making judgments about past effort, and 3) switching strategies and/or tactics. Frequencies for each are shown in **Figure 8**.

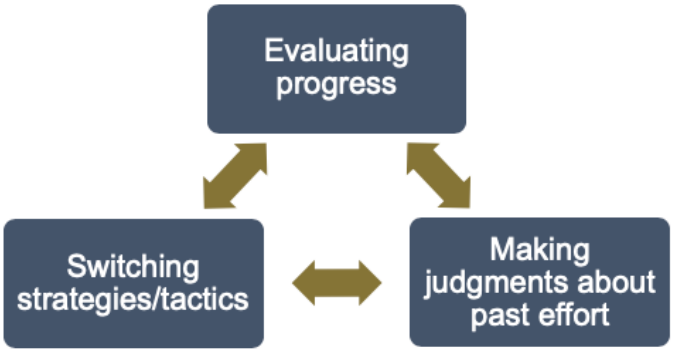

Figure 7. Primary Tactics within the Self-Monitoring Strategy

For example, some participants reported a consistent cycle of evaluating their current situation, judging the quality of their past use of SRL strategies/tactics, and then changing their behavior for the future by switching to alternative strategies/tactics, while others alternated between evaluating their progress and other judgments of past effort without actually implementing different strategies/tactics for the future. However, where metacognitive learning strategies in the literature typically refer primarily to regulation of cognitive processing strategies (e.g., Pintrich, 1999), participants in the current study more frequently reported monitoring progress towards completion of discrete tasks (e.g., coursework) or long-term goals (e.g., obtaining new employment).

Evaluation of progress was a critical tactic in this strategy. The interview protocol assessed varying 'levels' of goals, from proximal goals such as completing coursework during a particularly busy week to more distal post-graduation work goals. At the most distal level, progress evaluation might refer to a participant's assessment of whether he is on track to achieve his goal of being hired as a software engineer. One participant, for example, explained that he kept track of the gap between skills required by his ideal jobs and his current skillset, and used this information to help choose courses that would close

the perceived gaps. However, most references to this tactic referred to evaluating progress on more specific tasks like coursework. Interestingly, while many participants reported evaluating progress for similar purposes (to maintain or improve performance), their methods for doing so varied widely based on differing values or personal standards. In other words, while learners might occasionally receive external feedback that triggers or influences evaluations, such as failing grades or a missed deadline, most references to evaluating one's progress tend to show that adult learners in the current study have developed a personal set of expectations for what constitutes 'acceptable' progress.

Some participants, for example, reported a high level, affective evaluation of their progress that was primarily based on subjective difficulty. For example, one participant reported that "As I'm doing it, I just kind of gauge OK, this is going to be easier than I thought or wow, this is a lot more challenging than I thought." I refer to this operationalization as "evaluating progress by understanding". Other participants reported a much more systematic means of evaluating progress, where they broke down a task into its component parts and kept track of how many 'subtasks' were remaining. An example of this is a participant who created weekly course checklists and continuously monitored progress according to that standard. He was concerned less with full comprehension of the material, and more by the rate at which he was completing assignments or readings. I refer to this operationalization as "evaluating progress by completion". Finally, some participants evaluated their progress by soliciting feedback from others within the program: "The other thing is just discussing with other students or with the TAs, am I actually on the right path? Because, you know, I don't want to work on

something for four hours, only to find out I was thinking about it the wrong way." I refer to this operationalization as "evaluating progress by social comparison".

Perhaps the most important function of this tactic, regardless of how it is implemented, is that it allows learners to acknowledge points when progress has stalled and subsequently adopt more adaptive tactics. Evaluations of progress (by any means) tend to lead into reflection on past tactics' effectiveness only when the evaluation is negative. For example, a student who performs well on a project will likely not spend too much time reflecting on whether or how to change his time management and working habits (except to note that they were effective). He may even acknowledge areas where improvements could be made, but overall is unlikely to follow this reflection by switching strategies or tactics. One such participant reported that while his time management skills aren't perfect, they still allow him to perform at a personally acceptable level: "It pushes a lot of pressure on the end of the week, you know, trying to get those assignments done … I could probably spread out [assignments] a little bit better, but so far that's worked OK for me."

Meanwhile, a student who performs poorly at the same task may spend more time reflecting on what went wrong and figuring out what strategies were less effective. His judgments about past strategy use may or may not include an intention to change his behavior in the future. In the current study, participants who indicated that they did not intend to change their behavior reported that factors affecting this decision included 1) low self-efficacy for changing the behavior or 2) an assumption that benefits gained from doing so may not be important enough to warrant making the change. For example, one participant reported infrequent use of discussion boards even though he suspected they

would be helpful to him: “I'm probably not as involved [in discussion boards] as I would like to be and not because I don't think there's value, right? … But it's a time thing.”

On the other hand, participants who reported an intention to switch or past success in switching to more effective strategies or tactics frequently implied that they did so because the perceived consequences of not making the change were severe, or because they would not be able to handle the demands of the program without doing so. One participant reported that she overcame long-term poor use of time management tactics during her time in the program: “I'm really bad at managing my time in the past… But this full-time job, with my son, and this on top of it really, really made me take a deep look at how I handle my time.” In the case that learners have both a belief that switching strategies or tactics is important as well as confidence in their ability to do so, they seem to be more likely to follow through.

Participants also reported a variety of situational factors or experiences that facilitated switching to a new strategy or tactic, including spending a long time on an unsuccessful approach (e.g., “As a rule of thumb, probably if you spend, you know, 24 hours and you haven't made any progress–”), taking a break from the task in order to ‘reset’ their thought process (e.g., “I get up, walk around, do whatever… When I come back, I often will have a better answer.”), or getting a jarring piece of negative feedback (e.g., “The first exam I did very badly … I mean there is no other option but to double the amount of time that I put in.”). For participants who reported switching strategies or tactics, the two most common behavioral changes were 1) seeking additional help from either peers or instructors/TAs and 2) adhering more closely to time management tactics.

Examination of participants' references to self-monitoring revealed a primary reliance on three tactics, namely 1) evaluating progress, 2) making judgments about past effort, and 3) switching strategies and/or tactics. Unlike extant models of self-monitoring during SRL (e.g., Zimmerman & Moylan, 2009), in which learners reflect on and manage cognitive strategies deployed during the learning process, learners in the current study monitored more 'macro' level strategies and tactics which affect goal progress.

The typical participant reported using these tactics cyclically, beginning with an evaluation of progress. The object of these evaluations ranged from more proximal tasks (e.g., completion of weekly assignments) to distal goals (e.g., obtaining a new job). Participants also reported using a variety of criteria to define satisfactory progress, including subjective difficulty of a task (i.e., evaluation by understanding), objective task completion (i.e., evaluation by completion), and progress/performance relative to other learners (i.e., evaluation by social comparison). Positive evaluations of progress 'ended the cycle', so to speak, and resulted in maintenance of behavior until the next evaluation. On the other hand, negative evaluations typically led participants to make judgments of whether their past strategy and tactic use had been appropriate. When participants found that their past strategy use was ineffective, two factors seemed to influence whether or not they intended to switch strategies or tactics in the future. First, learners must have sufficient self-efficacy for change (i.e., they must believe that they are capable of employing different tactics). They must also perceive that the utility of changing their tactics is sufficiently high. That is, they must believe that changing tactics will provide a significant benefit (or alternatively, that not doing so will result in severe consequences). These findings are consistent with previous findings on the relationship between motivation and SRL, where

both expectancy (i.e., belief in likelihood of success) and value (i.e., perceived importance of and interest in a given task) are important for continued engagement in SRL behaviors (e.g., Pintrich & De Groot, 1990).

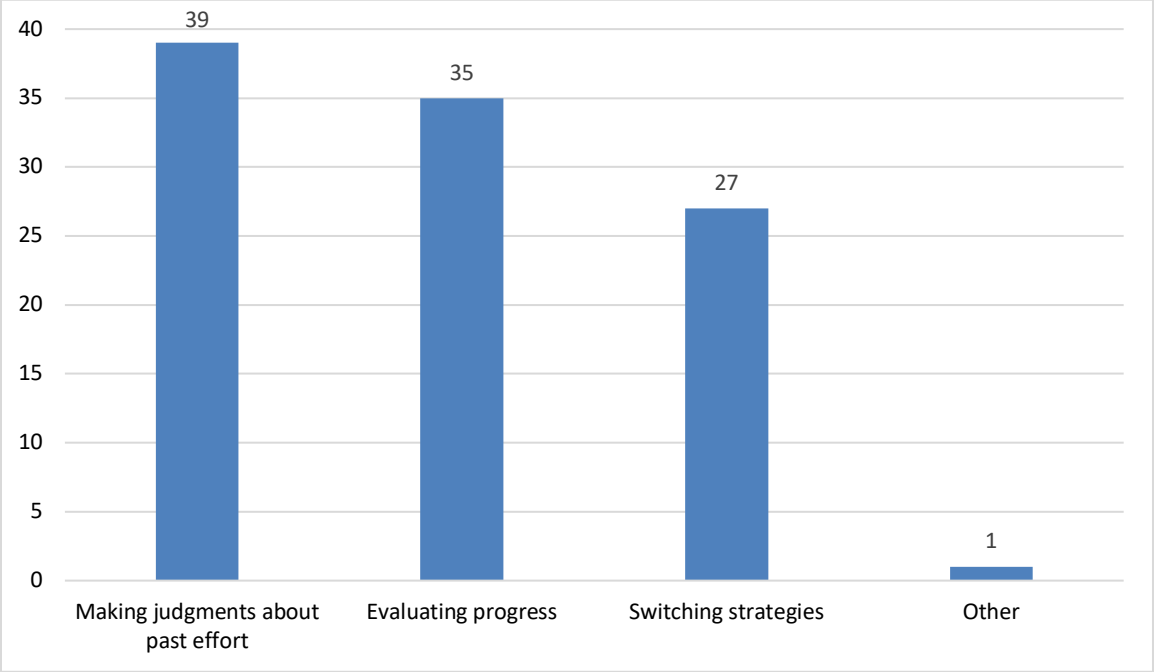

Figure 8. Frequency of Self-Monitoring References by Tactic

3.2.2.6 Overall Summary of Thematic Analysis

Overall, a thematic analysis of the interviews conducted during this study revealed that participants' SRL behaviors can be well described by five primary strategies, which can then be broken down into 27 more granular tactics (for a table of all tactics within strategies, see **Appendix B**). Within each strategy, themes emerged that provide insight into the nature of why, when, and how participants use particular tactics. These themes were reviewed in the 'Summary of Findings' subsections that concluded discussion of each strategy and are summarized below in **Table 7**.

Table 7. Summary of Themes Found Across SRL Strategies

Strategy	Emergent Themes
Time Management and Effort Regulation	• 1) Perceived value of time management and effort regulation tactics is a function of non-learning demands • 2) Non-learning demands may place a cap on time/effort devoted to the program, suggesting that effective management of these demands is central to participants' SRL strategy use • 3) Participants tended to prefer using a priori management tactics when necessary and used coping tactics primarily as a secondary approach when experiencing difficulties or unexpected obstacles
Social Help-Seeking	• 1) Participants relied on diverse types of social connections for help, including fellow students, coworkers, spouses/family, and friends • 2) These sources of social help provided unique types of help (e.g., spouses and family members are more likely to assist with management of non-learning demands, while coworkers and fellow students are more likely to provide technical or course-related assistance) • 3) Some participants (e.g., those with extant careers in computer science) are more likely than others to report having access to social resources that can provide technical assistance • 4) Some participants were less willing than others to seek help from OMSCS peers (concerns about appearing incapable) or coworkers (concerns about appearing unprofessional)
Program-Based Help-Seeking	• 1) Course-related factors (e.g., difficulty, instructor availability) seem to be the most important predictor of whether participants used this strategy • 2) Non-learning demands (e.g., work schedule) also impact participants' use of tactics within this strategy, particularly interaction with instructors
Online Help-Seeking	• 1) Use of online help-seeking tactics were not ubiquitous, but participants who reported using them cited them as critical to their success • 2) Online searching and unofficial course sites had distinct functions (technical assistance and course enrollment decision-making respectively) • 3) Some participants used online searching as either a partial or full replacement for social help-seeking tactics (i.e., use of discussion boards)
Self-Monitoring	• 1) Participants tended to self-monitor 'macro' strategies and tactics affecting goal progress, rather than cognitive strategies for learning • 2) Self-monitoring often occurs cyclically, but is not strictly restricted to a particular pattern of tactic use • 3) Evaluations of progress differ in both content (e.g., progress on assignments versus progress towards career-related goals) and criteria (i.e., the metric by which progress is judged as (in)sufficient) • 4) Judgments of past tactic use as ineffective may or may not result in behavioral change, depending on the participant's self-efficacy for change and perceived utility of switching tactics

3.2.3 Exploratory Analyses

The results of the thematic analysis suggest that management of non-learning demands (e.g., childcare) is critical to learning success, and that social help-seeking or related strategies are central to self-regulated learning in adult online learners. However, because I oversampled women from a heavily (approximately 85%) male population and because previous work suggests that women tend to bear the brunt of household labor even when working in relatively high-status roles (Lachance-Grzela & Bouchard, 2010), it is plausible that these findings reflect the structure of my sample rather than adult online learners more broadly. For this reason, I examined the frequency by gender of references to tactics referencing management of household labor (i.e., 'outsourcing household tasks', 'taking time away from home', and 'asking spouse/family member to pick up slack'). Additionally, because there were more males (N = 34) than females (N = 31) in the subset of interviews used for the thematic analysis, I calculated the average number of references to each tactic per participant by gender (see **Table 8**).

Table 8. Average References to Tactics for Household Management by Gender

	Outsourcing household tasks	Taking time away from home	Asking spouse/family member to pick up slack	Total aggregated references
Men	0.00	1.24	0.82	2.059
Women	0.13	0.90	0.74	1.774
Total	***0.06***	***1.08***	***0.79***	***1.923***

Drastic differences in frequency of references that favored women would suggest that these tactics may be more adaptive to women and less critical for men. However, results of this exploratory analysis did not reveal such a distribution (see **Figure 9** for frequencies of each tactic by gender). While contextual differences in caregiving and other

domestic obligations should certainly be examined in future studies, the current data do not seem to suggest that reliance on tactics for managing household labor (e.g., through social help-seeking) are predominately used by women.

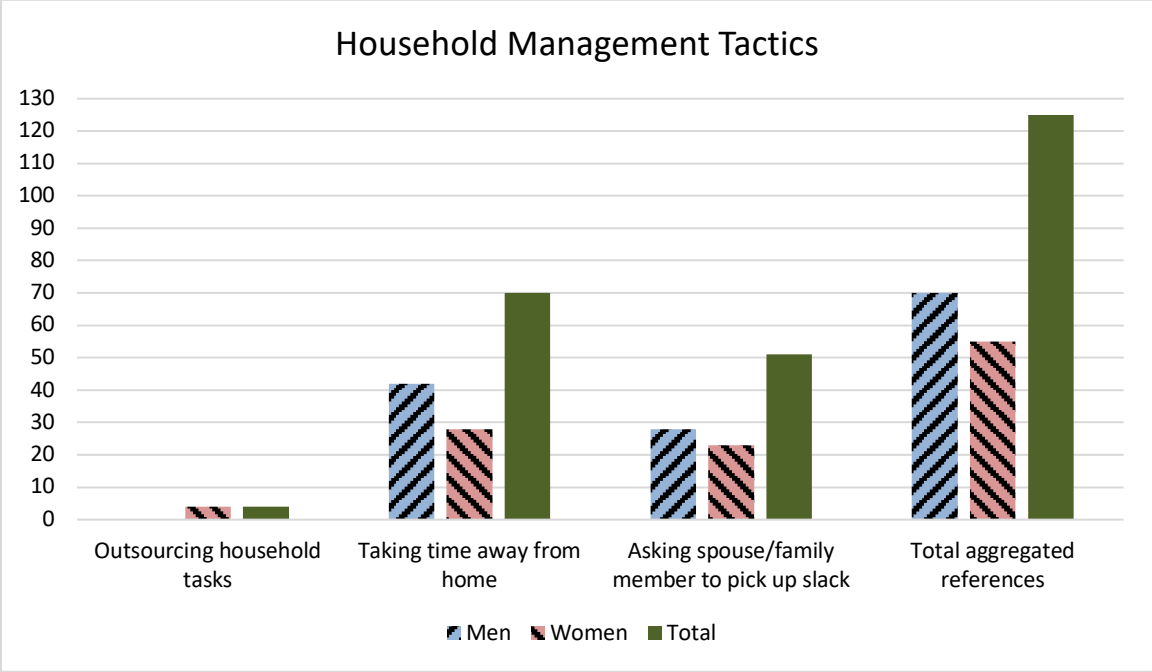

Figure 9. Frequency of References to Tactics for Household Management by Gender

CHAPTER 4. DISCUSSION

This study used a qualitative approach to investigate SRL strategy use in a sample of working adults enrolled in an online, graduate-level STEM degree program. To my knowledge, it is the first to provide rigorous, systematic qualitative evidence on the nature of SRL strategies used by working adults in an online advanced skill training program. Consistent with prior findings (e.g., Broadbent & Poon, 2015), online adult learners do rely on self-regulatory strategies to manage their learning, especially those regarding time management and help-seeking. However, critical strategies for online adult learners extend past those delineated by extant models of SRL. In particular, participants in the current study placed emphasis on the importance of a priori planning of time allocation and help-seeking from a variety of social contacts (e.g., family, friends) for managing both learning and non-learning demands. Below, I briefly review my findings and discuss their theoretical implications. I then discuss limitations of the current study and provide suggestions/directions for future research.

4.1 Thematic Analysis Summary and Implications

Thematic analysis of the 75 interviews conducted in this study produced 5 major SRL strategies and 27 total tactics. The most frequently referenced strategies (Time Management & Effort Regulation and Social Help-Seeking) refer to 'macro' level strategy use that previous work suggests will have higher utility for adult online learners (compared to more 'micro' cognitive strategies; Broadbent & Poon, 2015). Participants relied heavily on tactics for allocating time and effort across learning and non-learning demands. Although this was expressed as both a priori management and coping tactics, participants

expressed a preference for the former where possible. That is, given the choice between anticipating obstacles to learning or dealing with them *ad hoc*, online adult learners seem to prefer planning tactics that facilitate the development and execution of means-end plans for goal achievement (Bandura, 1988).

Regarding Social Help-Seeking tactics, participants reported reaching out to a wide variety of social connections, both within and outside of OMSCS. This represents an important departure from previous work on help-seeking during SRL. Rather than consisting solely of feedback from the instructor to the student, help-seeking in the current study is depicted as also being largely supported by academic peers, friends, family, and coworkers who provide assistance with tasks ranging from coursework to childcare and career development. The latter two examples are particularly unique to adult learners. However, not all participants reported equal access to or use of social resources for help. This disparity was most notable when considering participants' access to social connections who can provide technical (i.e., CS-related) assistance. While some participants reported having access to a wide range of technologically capable coworkers, friends, and family members, others had little to no access to these types of social resources. Sociological studies suggest that uneven accumulation of social capital (i.e., resources accessible through social relationships; Lin, 2001) over the life-course can result in distinct social and professional advantages for some groups over others (O'Rand, 2006). Occupational social capital, for example, tends to increase with age but is distributed differently across the social networks of men and women (McDonald & Mair, 2010). In the current study, for example, it is possible that participants who had invested longer periods of time into a CS-related career, or who occupy higher-status roles, were more able

to rely on non-OMSCS social connections for technical help. In other words, access to valuable social assistance may be unevenly distributed across adult learners such that those attempting to reskill or enter a new occupation may experience unique disadvantages.

Less frequently reported strategies included help-seeking both within and outside of the degree program (Program-Based and Online Help-Seeking respectively) as well as Self-Monitoring tactics which can be compared to past studies' emphasis on metacognition (e.g., Zimmerman & Moylan, 2009). Consistent with findings from past work (e.g., Hao, Wright, Barnes, & Branch, 2016), help-seeking from program-based resources such as instructors or TAs was predicated primarily on course difficulty. However, some participants in the current study additionally reported that non-learning demands (e.g., work schedules) prevented them from engaging with instructors even when it may have been beneficial. In contrast, Online Help-Seeking tactics, which provided both technical assistance (e.g., troubleshooting a section of code) and acted as decision-making aids (i.e., for course enrollment), were perceived as beneficial in part because they are highly flexible and could be used asynchronously (i.e., could be adapted to non-learning demands on time allocation). Finally, Self-Monitoring tactics enabled participants to track progress for both proximal (e.g., assignment completion) and distal (e.g., career-related) goals, and maintain or adjust strategy/tactic use according to the outcomes of these evaluations. While this has meaningful parallels to metacognitive strategy use as discussed in previous models of SRL (e.g., Zimmerman & Moylan, 2009), past work focused primarily on monitoring and adjustment of cognitive strategies (e.g., rehearsal of information) rather than the 'macro' strategies like time management or help-seeking consistently referenced by participants in the current study.

The results summarized here delineate several striking departures from extant literature using younger full-time student samples: 1) a reliance on 'macro' SRL strategies and tactics, 2) the inclusion and importance of a priori time management tactics for dealing with non-learning demands (e.g., work schedules, childcare), and 3) the existence of a more functionally diverse social network (e.g., family, friends, coworkers) from which both learning and non-learning assistance may be obtained. In addition, they provide a strongly affirmative answer to one of the primary research aims of the study (i.e., to provide evidence that an augmentation of current SRL models would capture additional variance in online adult learners' SRL strategy and tactic use). While the current findings do not delineate the entire universe of SRL tactics employed by online adult learners (Research Question 1; see limitations section for more discussion on this point), they do suggest that social help-seeking and management of non-learning demands are critical determinants of online adult learners' learning goal achievement.

This study highlights meaningful aspects of online adult learners' SRL strategy and tactic use that are not reported for younger populations, and which therefore have not been a focus of studies of SRL in traditional contexts. SRL is goal-driven in that strategy and tactic choice is a function of goal choice (Zimmerman, 1998; Zimmerman 2000), and multiple goals can be held simultaneously (Kanfer, 1990). Accordingly, adult online learners report both intrinsic (e.g., pursuing an interest or curiosity in a particular subject matter) and extrinsic (e.g., obtaining a promotion or new job) motivations for pursuing their learning program (Duncan, Eichner, & Joyner, 2020). College students, like adult learners, have made a volitional choice to pursue learning and typically report both intrinsic and extrinsic reasons for doing so (Lin, McKeachie, & Kim, 2003). However, college

students' learning goals differ from those of adult learners in two critical ways. First, college students of a normative age are typically pursuing career *entry*, while adult learners are typically pursuing career *development*. Second, adult learners' goals tend to be more *focused* than those of college populations. For example, a typical college freshman may enter a four-year university with the intention of pursuing an interest in the field of Computer Science broadly, while a typical participant in the current study had an existing career in the field and may be seeking a promotion or change in work tasks.

Differences in learning goals may therefore reflect adult learners' age-related accumulated vocational experience, knowledge, and skills (Kanfer, Beier, & Ackerman, 2012) compared to their younger peers. Likewise, differences in SRL strategy use reflect adult learners' more fully developed social and professional networks (McDonald & Mair, 2010) and their unique non-learning demands (e.g., full-time work, family obligations) that do not impact most traditional college students. While previous work has argued that management of these demands is critical for adults' learning success (Money & Dean, 2019; Wladis et al., 2015), this study is the first to identify specific tactics by which this management occurs.

4.2 Limitations

The current study had three primary limitations. First, checks on coder consistency in Stage 1 revealed that one out of the five primary SRL strategies (Self-Monitoring) had a kappa value lower than the target of 0.4. While I attempted to mitigate this issue by providing all coders with an instructive manual before further coding occurred, this was done in response to issues encountered during early analyses. Future studies should

consider proactively providing a broader range of training or resources before coding begins to minimize the likelihood of major disagreements among coders. Importantly, this recommendation does not decrease the importance of a rigorous check on coder consistency. It simply provides coders with a clearer understanding of constructs involved in the study.

The second limitation pertains to interview coding. Two out of five primary SRL strategies (Self-Monitoring and Program-Based Help-Seeking) showed significant differences in average number of references across the three interviewers. Specifically, participants who spoke to one of the three interviewers referenced these two strategies with a significantly higher frequency than those who spoke to either of the other two interviewers. This may indicate that interviewers did not engage in fully consistent probing behaviors and suggests that future qualitative studies of this topic should consider employing more extensive training protocols before data collection begins.

The final limitation concerns the extent to which conclusions can reasonably be drawn from results of *qualitative analyses in general*. Qualitative methods are sources of rich data which may be valuable in shaping theory or informing future work. However, they are limited compared to quantitative methods in that they cannot support inferential conclusions about group or individual differences or predict variation in a given criterion of interest (e.g., program completion, learner satisfaction).

4.3 Future Directions and Practical Implications

Overall, the results of this study provide proof of concept for continued development of a SRL measure aimed at adults engaged in online work skills training

programs. In particular, researchers interested in this topic should use the current findings as a foundation to identify SRL strategies and tactics that capture the diverse demands and resources involved in adult reskilling and upskilling programs. While the current study provides initial evidence for and examples of these tactics, the results are by no means exhaustive and may have been limited in scope by the structure of the interview protocol (i.e., by a primary focus on questions about strategies for managing coursework and moving past challenges experienced during the program). Future research should continue to build on the types of SRL strategies and tactics employed by online adult learners across different types of skill training programs.

Consistent with theory as well as the findings of this investigation, any SRL taxonomy for online adult learners should include a fourth 'level' of strategies and/or tactics that focus on management of non-learning demands and use of resources (e.g., social, online) outside of the degree program. Ultimately, development and validation of a measure assessing SRL in online adult learners will allow for an expanded research program that allows for more complex analyses. The exploratory analyses conducted in the current study would have been more appropriate in a design where survey data was collected, as discussed above. Development of a measure for SRL in online adult learners would also 'set the stage' for richer theoretical investigations. The current study provides potential directions for such research. For example, within the strategy of Time Management and Effort Regulation, a meaningful proportion of participants seemed to express a preference for tactics that involved planning ahead rather than coping after a challenge arises. Future studies might examine the perceived utility or attractiveness of

planning versus coping tactics among adult learners as a function of individual differences (e.g., in motivational traits).

Finally, the results of the current investigation have meaningful practical implications for how working adults might become more effective distance learners. Recent studies suggest that well-timed interventions can increase online learners' use of SRL strategies, which then lead to improvements in relevant learning outcomes (e.g., course completion; Jansen, van Leeuwen, Janssen, Conijn, & Kester, 2020; Wong et al., 2019). However, these studies were largely based on traditional models of SRL (e.g., Zimmerman. 1989; 1990), which focus solely on management of the learning process itself. Implementation of interventions that additionally focus on management on non-learning demands may have incremental benefits for adult learners.

4.4 Conclusion

Changes in the nature of work that demand adult upskilling and reskilling have led to a sharp rise in the popularity of online training programs. To make these programs effective, more needs to be understood about how working adults effectively manage learning in non-traditional settings. My findings suggest that extension of extant models of SRL strategy use would provide additional insight into how working adults manage their learning in online contexts. Further, this study shows that there are fundamental learning management differences between online adult learners and learners in traditional contexts, including environmental demands on time and available social resources. While previous work has suggested that meaningful differences in learning management may exist between, for example, online adult learners and traditional collegiate populations, this

study represents the first attempt to more fully delineate *how* the former employs self-regulatory strategies to achieve learning goals. Additionally, it highlights the need for further research that will 1) conduct additional investigations that capture the nature of online adult learners' strategy use in diverse educational contexts) and 2) develop and validate SRL measures based on the findings of such investigations.

APPENDIX A. INTERVIEW PROTOCOL

Tell me a few things about your background.

- What's your job now? Are you working full-time? Does it involve computing? How important are advanced computing skills in your job?
- What's your undergrad degree in? Do you already have a Master's degree?
- Have you completed any other computer science trainings?

If they've taken training, follow up as needed. Otherwise, move on.

- What kind? Why did you do them? *(*Required by job? Own initiative?)
- What does OMSCS offer that your other trainings don't?

Why did you decide to pursue a degree in computer science? And why a *graduate* degree?

- What are your goals with this degree?
- Why are you pursuing this degree at Georgia Tech?
- How did you hear about OMSCS?
- Why did you choose an online versus an on-campus program?

Now, I'd like to learn a little bit about your decision to apply for and enroll in OMSCS. When you decided to apply, did you consult with anyone? Friends/family/coworkers?

- Was anyone particularly influential in your decision to pursue this degree?
- Was there anything or anyone holding you back?
- Did you know anyone in OMSCS? How about in other online degree programs?
- Did anyone help you to apply? Friends/family/someone at work?
- If you hadn't enrolled, what would you have done instead (next best alternative)?

Let's talk about your experience as an OMSCS student. What is it like to be an OMSCS student?

- What parts of the OMSCS program do you enjoy most? What makes it challenging? (What is the best thing about OMSCS? The most challenging?)

Let's talk a little bit more about your courses. What courses are you taking right now?

- *How did you decide which courses to take?
- *(optional)* What do you do if a course you are interested in isn't available?

What does your typical week as an OMSCS student look like?

- Do you have dedicated time you put aside for OMSCS? Or do you adapt your study schedule to other responsibilities?
- When do you watch video lectures? Do homework? Prep for exams?
- On average, how much time do you spend on homework per week?

What's your routine for listening to lectures?

- Do you typically watch all the way through? Do you pause, replay?
- What are your strategies for watching the lectures? Taking notes?

What do you do when you don't understand course material or you don't know how to complete an assignment?

- How do you change your approach to the task if something isn't working?
- Do you talk to the TA/other students? Re-read notes/re-watch lectures?
- Do you spend more time/effort on that assignment?

In a typical week, how do you decide how much time or effort you'll need to put into a course?

- How, if at all, does this change if you expect a course will be easier/harder than usual?
- How do you decide to keep working on a confusing topic or to move on to other tasks?
- Do you ask students who have previously taken the course what they did to succeed?

I'm also interested in what communication and interaction is like in OMSCS. Do you interact with other students in the program?

- How would you describe your interactions with other students?
- Do you engage with students on online platforms? Have you used/do you use Facebook, reddit, or other forms of social media to connect with other OMSCS students?
- Have you met in person with other OMSCS students? If so, what do you get out of those meetings?

What interactions do you have with your teaching assistants/professors?

- How do you communicate with your TAs/professors?
- Is that interaction limited to the course you are taking?

Where do you get feedback on how you are doing in the program?

Do you talk to colleagues at work about your participation in the program (such as materials that you are covering in class or your experiences overall)? What about your friends outside the program?

When you're looking ahead to a particularly busy time in your class schedule, how do you make sure you're prepared?

- What helps you feel more confident in your ability to manage all your responsibilities?

If you're struggling in a course or on an assignment, how do you get back on track?

How do you balance your academic responsibilities with your responsibilities at work and home?

- Have you had to make adjustments to other areas of your life to accommodate OMSCS responsibilities?
- Is there anyone supporting you in your family, circle of friends, peers, or coworkers to manage your daily responsibilities? How do they help you?
- Is there anyone where you wished you would get more support from?

How do you make it work when your responsibilities at home, work, and school conflict?

- (*Follow up, skip if needed*) How do you decide which of these priorities are most important?

Who (family, friends, work, OMSCS peers) do you typically turn to for advice and support when you encounter a challenge in your program?

- What kind of support (emotional, informational, financial) have you found most helpful and in which situations?

Do you ever have doubts about being in the program?

- Have you had any other challenges we haven't discussed yet? How have you dealt with (or are dealing with) that challenge?

Is there anything else that we haven't already covered and that you'd like to share about your experience in OMSCS?

APPENDIX B. CODING PROTOCOL

Strategy	Tactic
Time Management and Effort Regulation	Keeping a calendar or schedule
	Increasing time or effort allocated to a task
	Reallocating time away from home
	Reallocating time away from work
	Setting priorities
	Starting tasks ahead of time
	Adjusting or lowering coursework
	Lowering standard of performance
	Temporarily step away from a task
	Estimating time required for a task
	Outsource household tasks
Social Help-Seeking	Using official discussion boards
	Using unofficial discussion boards
	Ask family to pick up slack at home
	Ask coworkers to pick up slack at work
	Ask advice from OMSCS peers
	Study with OMSCS peers
	OMSCS networking
Program-Based Help-Seeking	Interacting with instructors or TAs
	Accessing or using lectures or notes
	Doing or reviewing assigned readings
	Using OMSCS administrative resources
Online Help-Seeking	Searching for technical assistance online
	Using unofficial course sites
Self-Monitoring	Evaluating progress
	Making judgments about past effort
	Switching strategies or tactics

APPENDIX C. ABRIDGED CODING MANUAL

Strategy	Tactic	Example
Utilizing Social Resources		
	Asking for advice or recommendations from other students	"[Got you. And do you ever ask students who have maybe previously taken a course or read through students who have previously taken a course and what they said is necessary to succeed?] Yes. Yeah. I've seen people post some pointers like on blogs and things like that, and I find that that's really helpful." *Reason: This code is meant to pick up real time discussion between one or several students. So asking a friend in the program for course advice, talking in a Slack channel about what to take or how to pass a class, etc, would fit, but this one doesn't because they're just going online and reading reviews. I would put this quote under 'Non-Program Resources\Unofficial Course Sites.*
Monitoring Progress		
	Evaluating progress	"I think the more challenging parts is just that, like at least in the class I've taken, just like kind of trying to figure out some of the expectations, like around, you know, deliverables and stuff like that. Like, you know, is what I'm doing enough or is it too much or too little? You know, am I going deep enough [inaudible] forever. There's just very little feedback." *Reason: This quote talks about assessing whether they're trying too hard or not hard enough, not how far they're getting on a task.*
	Making judgments about past effort	"I guess like, I mean, I think I had one assignment that I did have a hard time with and I had to -- I basically just started over with it. You know, like it was a program [inaudible] or whatever, and I was just not getting anywhere and I just was kind of making things worse the more I changed it." *Reason: The respondent is looking back at/reflecting on an assignment, so I see why it might have been coded here. However, he was primarily discussing the realization that no more progress was being made. This quote seems to fit better in Evaluating Progress.*

	Switching strategies	"Whether you think it's a good question or not, you know, you get to that point where you just need to ask, and it usually helps other people, but just having that tool to ask those questions, and to query through Piazza and Slack to see if, you know, if you can find any answers, or things, projects that will move forward with your project, I think they're good, good tools." *Reason: To me, this seems less like a situation where they're consciously changing their approach to a task by using Piazza. This fits in more with the Using Official/Unofficial Discussion Boards code where respondents refer to using Piazza or Slack when they need help on a project.*
	Other	"So what I would do is if I had--I would put together early in the day like my personal goals for a particular project, and what I wanted to get past. If I finished it, great." *Reason: This could be coded under Evaluating Progress. I can see the distinction where that code doesn't explicitly discuss daily goals, but I think making that distinction is splitting hairs. This quote would go under Evaluating Progress.*
Time Management & Effort Regulation		
	Decreasing standard of acceptable performance	"I mean there's no structure or whatever. It's more kind of ad hoc as things come up. You know, like I know I have to complete certain tasks or, you know, spend so much time with the kids, spend so much time doing stuff at work, and then I have assignments for OMSCS that have to be done. So I just kind of have to balance it that way and just kind of, you know, there's things that are going to have to be traded off." *Reason: This quote would be a better fit for Setting Priorities, given the context of the question asked (asking the participant how they balance work/home/school)..*
	Setting priorities	"I like to do what--I have a Word document that, oh my gosh, I've been doing since early 2000, and every year, I have a new file, and I just kind of put my--it's like a to-do list, you know? And it varies on what I put on it, but it's just a simple log, and a date, that's the name of the file, and I put the things I want to do that day, things I need to look into, and that kind of helps me to stay focused on the things I want to get done that day." *Reason: This is more of an organizational strategy, where the respondent is scheduling a to-do list for the day, so it would fit better under Keeping a Calendar/Schedule.*

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